Financial Structure, Economic Growth and Firm Productivity in Sub Saharan Africa

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Abstract

Over the years, an extensive body of literature has emerged on the role that financial structure, the blend of bank-based and market-based intermediation, plays in economic growth. However, there has been no general agreement on this role. Some studies find that financial intermediaries and markets are both important for growth while some other studies claim the superiority of one type of financial system (bank-based or market based) over the other. There are also studies that argue that financial structure does not matter while some more recent studies show that too much finance may harm growth. The debate is important, as having some idea of the form of financial structure that is growth promoting can help policy makers take informed decisions. It is also a particularly important issue for developing countries, as choosing the wrong financial structure can hold back growth and development. The existing literature tends to focus on developed countries, however, with only a few studies considering developing countries or regions. Even fewer consider Sub Saharan Africa (SSA). In the past, this was mainly because of inadequate stock market data, as most SSA countries did not have stock markets. Since the 1980s, however, this has changed, with stock markets being established in many SSA countries.

This thesis contributes to the financial structure and economic growth literature by providing empirical evidence from SSA. The thesis is structured around three related studies. The first study uses dynamic panel estimation techniques to investigate both the short and long-run effects of financial structure on growth, focusing on 14 SSA countries over the period 1980-2014. The results indicate that financial structure is not significant in explaining growth in the region. This could be attributed to the idiosyncratic nature of SSA banks, which are reluctant to lend to the private sector and prefer to invest in safe, risk-free government securities. It could also be a result of stringent stock market listing requirements that prevent most small and medium enterprises from raising funds. Cross country panel studies are valuable to investigate this further. However, it is important to consider the heterogeneous nature of countries in a panel, and the limits that cross country studies put on the variables that can be considered. For this reason, the second study focuses on a single country from SSA, Kenya, and offers a more detailed analysis using quarterly data for the period 2002-2014. Kenya has not been analysed in the relevant literature. The country is an interesting case study, as it has experienced a number of financial innovations and has a relatively well-developed financial system, but still faces low levels of development. Our study employs the Autoregressive Distributed Lag approach to cointegration, and considers the independent role of banks and of markets, along with the role of financial structure. Our findings are consistent to those of the panel study concerning the role of financial structure. Stock market development is, however, found to have a significantly positive effect on the country's economic growth.

This is possibly because Kenya was one of the first SSA countries to develop an alternative investment market aimed at small and young firms. The role of banking sector development has a negative effect. This finding can be partly explained by the large proportion of non-performing loans accumulated by Kenyan banks in the 1980's and the 1990's, along with a weak legal and regulatory framework.

The development of stock markets could have impacted upon growth in SSA economies through the provision of more financing choices for firms. This could influence their productivity and growth. To consider this channel in detail, the third study uses firm level data from the World Bank Enterprise Survey (WBES) to investigate the effect of different financing choices on the productivity of SSA firms. Using data for the period 2005 - 2013 from 26 countries, the study employs a linear Cobb-Douglas production function to estimate total factor productivity (TFP.) It then uses both parametric and non-parametric methods to analyse the effect of financing choices on TFP. The results indicate that firms that rely on bank debt rather than other forms of financing (e.g. internal finance, informal finance, private and public equity) are, on average, more productive. This can be partly attributed to the monitoring activities of banks and the threat of bankruptcy faced by firms.

Declaration

I hereby declare that this thesis is my original work. Where other people's work is used, acknowledgements have been made. I declare that neither this work, nor a part of it has been previously submitted for the award of a degree in this or any other university.

Signed by candidate

Dedication

To my parents, Mr. Samuel Mathenge Gitahi and Mrs. Grace Wangui Mathenge for their unconditional support and encouragement.

To the memory of my sister, Shelmith Wambui Mathenge. I still miss you.

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This thesis would not have been completed without the love, support and understanding of so many people. Firstly, I would like to thank the Almighty God, for the grace to stick it through to the end, for giving me good health, and for keeping me sane when everything around me felt like it was melting away. I would also like to sincerely thank my supervisor, Dr. Eftychia Nikolaidou for her guidance, support, understanding and commitment in providing timely feedback. Without her moral support and patience, this thesis would not have been completed on time.

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List of abbreviations

ADF	Augmented Dickey Fuller
AIMs	Alternative Investment Markets
ALTX	Alternative Exchange
ARDL	Auto-Regressive Distributed Lag
CDF	Cumulative Distribution Function
CDS	Central Depository System
DFE	Dynamic Fixed Effects
ECA	Economic Commission for Africa
GDP	Gross Domestic Product
GEMs	Growth and Enterprise Market segment
GFDD	Global Financial Development Database
GMM	Generalised Method of Moments
IMF	International Monetary Fund
IPOs	Initial Public Offers
ISIC	International Standard Industrial Classification
KPMG	Klynveld Peat Marwick Goerdeler
MENA	Middle East and North Africa
MG	Mean Group
MIMs	Main Investment Market segment
NBFIs	Non-Bank Financial Institutions
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary Least squares
PDF	Probability Distribution Function
PMG	Pooled Mean Group
PP	Phillips Perron
ROA	Return on Assets
SAPs	Structural Adjustment Programs
SMEs	Small and Micro Enterprises
SSA	Sub-Saharan Africa
TFP	Total Factor Productivity
UK	United Kingdom
UNECA	United Nations Economic Commission for Africa

USA	United States of America
USD	United States Dollar
WB	World Bank
WBES	World Bank Enterprise Survey
WDI	World Development Indicators

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Chapter 1

Introduction

1.1 Introduction and background

Most countries in Sub Saharan Africa (SSA) inherited their financial systems from their colonisers, and these were mainly banking institutions. Stock markets did not exist in most SSA countries before 1980. The establishment of stock markets followed financial reforms from the late 1980s. These were part of the Structural Adjustment Programs (SAPs) promoted by multilateral financial organisations, mainly the World Bank and the International Monetary Fund (IMF). Financial reforms in the region were considered incomplete without the establishment and development of stock markets (Yartey and Adjasi, 2007). Prior to 1989, there were only five[1] stock markets in SSA. Between 1988 – 1998, a further 9 countries[2] established stock markets, to keep pace with the reforms, and to promote economic growth. This brought the total number of stock markets in SSA in 1998 to 14 out of 48 countries in the region. The addition of stock markets to these financial systems was considered necessary, because research showed that stock markets are instrumental in promoting economic growth in both developed and developing countries (Levine, 1996; Levine and Zervos, 1998; Arestis, Demetriades and Luintel, 2001).

However, stock markets were established while the banking systems inherited by these countries were underdeveloped and underperforming. In the 1980s, many SSA countries were facing deteriorating economic conditions, macroeconomic and financial instability, fiscal imbalances, and financial distress (Marchettini, Mecagni and Maino, Rodolfo, 2015). Critics questioned whether African stock markets were established at the right time and for the right reasons, with some describing them as *"casinos"* (Levine, 1996). Pouncy (2002) notes that stock markets in SSA were a replication of existing stock markets in the west, and not a response to the need for capital by the real sector. They argued that these markets would not perform efficiently, given their huge costs and poor financial structures, and that such markets would not benefit the economies of some SSA countries (Yartey and Adjasi, 2007). Evidence exists to show that stock markets are only beneficial to growth in a country where there is recognition and protection of property and contractual rights.

Stock markets are also presented as institutions that can contribute to firm growth by expanding available sources of finance. However, firm performance in SSA is still currently constrained by lack of access to finance (Beck and Cull, 2014). Financing patterns differ across countries due to differences in the

[1] South Africa, Kenya, Nigeria, Zimbabwe, and Cote d'Ivoire
[2] Mauritius, Uganda, Tanzania, Zambia, Namibia, Botswana, Malawi, Ghana, Swaziland

development of banks and stock markets, as well as differences in legal institutions (Demirgüç-Kunt and Maksimovic, 1999). Small and medium enterprises have not benefited much from the existence of stock markets because of stringent listing requirements. The majority of the stock markets in SSA have been in existence for over two decades. However, they are still characterised as immature, thin, and inactive, and banks still constitute a large proportion of the SSA financial sector.

Stock markets and banks are the main sources of finance in SSA economies. They are therefore thought to play an important role in determining the speed and character of economic growth (Goldsmith, 1969). A branch of the finance-growth literature has emerged that aims to evaluate the role of financial structure in economic growth. Financial structure is described as the extent to which a country's financial system is either bank based or market-based. The main question that these empirical studies address is whether financial structure matters for growth. However, much of the research has concentrated on developed countries, mainly because there is more data available for these countries, given the fact that stock markets have been in existence in these countries longer than in developing countries, and particularly in SSA.

Despite empirical studies spanning decades on the effect of financial structure on economic growth, there is still no general agreement on whether financial structure matters for growth. The focus of early studies was the US and UK, as market-based economies, and Germany and Japan, as bank-based economies (Hoshi, Kashyap and Scharfstein, 1991; Weinstein and Yafeh, 1998; Morck and Nakamura, 1999). These studies made use of country specific indicators of financial structure, and concluded that financial structure matters for growth. For example, the indicator used to determine if Germany was bank-based is whether banks own shares in companies. For research on Japan, the indicator used is whether a company has a "main bank". For the investigation of the US and UK, the role of market takeovers as corporate control devices is used to determine the extent of a market-based economy (Arestis, Luintel and Luintel, 2004). These studies emphasize that the structure of financial systems is important in explaining growth, and suggest that Germany and Japan grew because their financial systems were bank-based, while the US and UK grew because their financial systems were market-based. Generalizations were thus reached regarding the relevance of financial structure for economic growth. Subsequent studies, however, show that the evidence drawn from analysing these countries cannot not be generalised because of the shortcomings of these studies. That is they make use of country specific indicators, and evaluate countries with similar growth rates, as well as similar real per capita income levels (Beck and Levine, 2002; Luintel *et al.*, 2008). It is argued that Japan performed better than the US in the 1980s because the former's economy was more bank-based. However, this view changed in the 1990s when

poor performance was recorded in the Japanese economy (Stulz, 2001). This pointed to the possibility of drawing misleading conclusions from studies based on country specific indicators. In addition, previous studies have analysed countries with similar growth rates, which means more empirical evidence is needed. Studies have been carried out that focus on developed countries. However, Africa, and specifically Sub-Saharan Africa, has not been widely studied. This is mainly because of the unavailability of comparable data on the nature of financial systems, and also because, prior to 1989, a few countries in SSA had functioning stock markets.

Existing evidence shows that different methods of analysis and different sample groupings provide conflicting results on the effect of financial structure on growth (Levine and Zervos, 1996; Pinno and Serletis, 2007; Luintel *et al.*, 2008, 2016). The failure to account for sample heterogeneities, for example, is a major criticism of panel based studies. For example, even after accounting for panel heterogeneities, Luintel et al. (2008) show the lack of consistency between panel based parameter estimates and time series parameter estimates. This inconclusive evidence does not however diminish the important role that finance plays in an economy. Neither does it diminish the positive role of finance found in some empirical studies (see for example (King & Levine (1993a); King & Levine (1993b); Bittencourt (2012) among others).

Thus, differences in approaches in the existing research on financial structure, will continue to yield different results. These will lead to varying conclusions on the importance of financial structure for long-run economic growth. This thesis contributes to the literature on financial structure and growth by focusing on SSA, a region that has largely been neglected in previous studies. First, to provide evidence from the region based on panel estimation methods. Second, it provides time series evidence based on Kenya, and compares results from panel and time series estimates for this country. Lastly, it investigates the role of financial structure at firm level, by analysing the effect of firm financing choices on firm productivity.

Chapter 2 investigates the role of financial structure in economic growth in SSA. The limited number of studies on SSA informs the choice of the region, as well as the availability of an updated dataset on financial system characteristics for economies across the globe (Cihak, Demirgüç-Kunt, Feyen and Levine, 2012). The first cross country study by Levine (2002) assumes homogeneity across all countries, which includes both developed and developing countries. Results from this study led to the conclusion that financial structure does not matter, and that the overall level of financial development is what matters for long-run growth. However, using the same database as Levine (2002), Pinno & Serletis (2007) allow

for heterogeneity across the countries. The latter study classified countries based on the statistical properties and the multidimensional structure, extracted using Bayesian methods. This resulted in a loose classification of countries as either developed or developing. Their results lead to a different conclusion from that of Levine (2002). They support the view that financial structure matters, and conclude that market-based financial systems benefit developed countries economically, while bank-based systems benefit developing countries.

Thus, there is hardly any consensus in the literature on the relative importance of bank-based vs market-based finance (Luintel *et al.*, 2008). There are a number of reasons for this, including the use of different variables to define financial structure, as well as different methodological approaches used. While some studies make use of time series data, others make use of panel or cross-sectional data. Critics of the latter method claim that the heterogeneous nature of countries means they cannot be pooled together in panel or cross sectional studies (Luintel *et al.*, 2008). Initial theories on financial structure pointed to the lack of an accepted definition of financial structure, and methods for its quantitative measurement (Goldsmith, 1959). It has been noted in the literature that the evaluation of a financial structure should include its size, breadth and composition, and should cover the key institutional players. These include, *inter alia*, central banks, commercial banks, development finance institutions, insurance funds, pension schemes, and financial markets (International Monetary Fund, 2005). However, as data from development finance institutions, insurance funds, and pension schemes is very limited, empirical studies tend to rely heavily on data from banks and stock markets. The lack of data from the above mentioned institutions is more pronounced in SSA countries. Thus, chapter two of our research, which covers our investigation of the role of financial structure on growth in selected countries in SSA from 1980 to 2014, also relies on indicators from commercial banks and stock markets.

Specifically, the study employs dynamic panel data estimation methods that include the pooled mean group (PMG), mean group (MG), and the dynamic fixed effects (DFE) estimators proposed by Pesaran, Shin, Smith, & others (1997) and Pesaran, Shin, & Smith (1999). PMG imposes homogeneity of group coefficients in the long-run, but allows the short-run coefficients, intercepts, and error variances to differ across groups. The MG averages the long-run and short-run coefficients over groups, while the DFE pools separate regressions by imposing a common slope. To justify homogeneity in the long-run, we make the assumption that these countries have access to the same technologies, and therefore their long-run growth patterns are similar. Our results show that financial structure is of no economic significance in explaining growth in the long-run, for the sample countries in our study. However, the short-run effects of financial structure are country specific, showing that financial structure matters in some countries, but

not in others. The next chapter is motivated by the discrepancy observed between panel/cross sectional estimations and time series estimations as noted by Luintel & Khan (2002). Thus, the chapter focuses on a single country.

The third chapter provides a more rigorous case study analysis of the role of financial structure on growth, focusing on Kenya. We use quarterly data for the period 2002 - 2014 and employ the Auto Regressive Distributed Lag (ARDL) bounds approach to cointegration of (Pesaran & Shin (1998). Kenya is selected as a case study because it has a well established financial system[3] relative to other developing countries in the region, and the data we need is available. Studies on financial structure in Kenya are based on cross sectional or panel studies which include Kenya in the sample e.g. in Levine (2002). Luintel et al. (2008) find that panel estimates do not correspond to time series estimates. Levine & Zervos (1996) also note that cross sectional studies and panel based studies mask specific features of different countries. There is therefore a need for a country specific study to further examine results from cross section studies and panel studies. This study extends the analysis by considering the role of banks and stock markets independently, before evaluating the influence of financial structure on growth. To the best of my knowledge, this is the first study that has been carried out on Kenya in a time series setting. The findings from the study concur with those from the panel based analysis, and we find support for the view that financial structure is not economically important in explaining growth in Kenya both in the short-run and in the long-run.

One of the ways in which the development of stock markets is likely to have an impact on growth in SSA economies is through the provision of more financing choices to firms, which could have an impact on their productivity and growth. Chapter four therefore takes a microeconomic approach to addressing the effect of firm financing choices on firm productivity. Lack of finance is one of the impediments to firm growth, and lack of access to finance is one of the most important constraints to firm growth (Beck and Demirguc-Kunt, 2006). As Girma & Vencappa (2015) note, financial systems can stimulate economic efficiency and offer more profitable growth opportunities. But for this to happen, firms should be able to access finance optimally from the financial system. The sources of firm finance vary from one region to another, and are dependent on a number of factors including costs, benefits, accessibility (Myers, 1984), institutional differences (Beck, Demirgüç-Kunt and Maksimovic, 2008), and the legal and financial environment (Porta *et al.*, 1998; Allen *et al.*, 2012). The choice of firm financing is not a random act, but a consequence of conscious financing choices made by firms (Mallick and Yang, 2011). Firms' funding

[3] Although less well developed than those of South Africa and Mauritius

choices, and their effect on firm performance, have been the focus of a number of studies, which have not reached consensus (see for example Jensen, Michael & Meckling (1976); Mallick & Yang (2011); Rahaman (2011)). These choices include debt, equity, internal funds, trade finance, and borrowing from friends and family (informal funds), among others. We add to the existing literature on the role of firm financing choices in firm productivity, by providing evidence from SSA, a region characterised by a large proportion of small and medium enterprises.

Using cross sectional data on firms from 26 countries obtained from the World Bank Enterprise Survey (WBES), this study employs both parametric and non-parametric approaches to determine the role of firms' financing choices on firm productivity. The parametric approach follows a cross section fixed effect regression estimation analysis. The non-parametric approach examines the distributional differences between and within groups that rely on different sources of finance that go beyond a description of statistical summaries of the data. The study follows Handcock & Morris (1998) for the non-parametric approach, and compares the distribution of firm productivity corresponding to the different financial choices. This way, the study is able to establish the stochastic dominance as well as to provide a ranking for the compared distributions. The measure of productivity is obtained using the traditional approach of estimating a production function following Ghosh (2009). In line with studies that evaluate the effect of financing choices on firm productivity (See Girma & Vencappa (2015); Nucci et al. (2005)), we quantify a firm's productivity as the Total Factor Productivity (TFP). The findings from the study support the agency cost theory of firm financing. This theory postulates that firms that rely on bank debt rather than other forms of financing (e.g. internal finance, informal finance, and private and public equity finance) are, on average, more productive. This leads us to conclude that bank finance is an important source for firm financing in SSA. This is not surprising, given that banks dominate most financial systems in Sub-Saharan Africa, with the majority of firms not qualified to participate in the stock markets due to the stringent listing rules. Furthermore, banks' monitoring activities ensure that firms remain profitable, to guarantee repayment of debt.

1.2 Organisation of the thesis

The rest of the thesis is organised as follows. Chapter two investigates the role of financial structure in economic growth in Sub-Saharan Africa, using dynamic panel estimation methods. This is done for a sample of 14 countries, from 1980 to 2014. Chapter three follows, with a country case study on the role of financial structure on growth, but also considers the independent roles of banks and stock markets. The objective is to compare panel estimates with time-series estimates, which have been shown to differ

in previous studies. The ARDL approach to cointegration is employed on quarterly data from 2002 to 2014. The fourth chapter uses firm level data from 26 countries and analyses the effect of financial structure on firm performance, using productivity as the measure of performance. The study makes use of ordinary least squares analysis using data from the World Bank Enterprise Survey (WBES). The final chapter provides a conclusion, with a discussion of the findings from the thesis, including policy implications, limitations of the work undertaken, and suggestions for future research.

Chapter 2

Financial Structure and Economic Growth: Evidence from Sub-Saharan Africa

2.1 Introduction and background

Since the early 1990s, there has been an increase in empirical research on the finance-growth nexus, with some studies employing formal growth models (see Levine 2005; King & Levine 1993a; King & Levine 1993b; Beck, Levine, et al. 2000) and others investigating the causal relationship between finance and growth (see Hassan et al. 2011; Christopoulos & Tsionas 2004; Demetriades & Hussein 1996; Levine et al. 2000 inter alia). A recent study that makes use of extended data (Rousseau and Wachtel, 2011) does not find very strong support for the widely held view that there is a positive relationship between finance and growth, or that countries grow faster when they have a well-developed financial system, as postulated in Levine (2005). Some more recent studies even show that too much finance may harm growth (Law and Singh, 2014).

Stock markets and banks are the main sources of finance in an economy. It is widely believed that they play an important role in determining the speed and character of economic growth (Goldsmith, 1955). As a result, a branch of the finance-growth literature has emerged that aims to evaluate the role of financial structure on economic growth. Financial structure is broadly defined as the mix of financial instruments, financial markets, and financial institutions in a country. A financial system with more reliance on the banking system is characterised as bank-based, while one that relies more on the stock market is characterised as market-based. More formally, financial structure is defined as the degree to which a country has a bank-based or market-based financial system (Demirguc-Kunt and Levine, 2001).

The empirical literature on the effect of financial structure on economic growth is not as extensive as the empirical literature on the role of financial development in economic growth. Goldsmith (1959) notes the lack of an accepted conceptual definition of financial structure, and how it should be measured. Recent studies on financial structure and economic growth featuring Germany and Japan as bank-based financial systems, and the United States of America (US) and the United Kingdom (UK) as market-based financial systems therefore made use of country specific definitions of financial structure (Luintel *et al.*, 2008). Generalizations were then reached on the relevance of financial structure, after these studies showed that financial structure was important in explaining growth in these four economies. However, Beck & Levine (2002) note that the evidence from analysis of these countries cannot be generalised,

because of their shortcomings. The studies argue that Japan performed better than the US in the 1980s because it was more "bank-based". However, this view changed in the 1990s when poor economic performance was recorded in Japan (Stulz, 2001). Most subsequent empirical studies investigated developed countries because of the availability of data and the existence of functional stock markets.

Sub-Saharan Africa (SSA) has not been widely studied, given the nonexistence of stock markets in many countries in the region. Stock markets in SSA are relatively new, with the majority established after 1989 (Yartey and Adjasi, 2007). Prior to this, there were only five stock markets in SSA[4]. This is not the case for developed countries, with established stock markets, which have been shown to play a positive role in promoting growth in these countries (Arestis, Demetriades and Luintel, 2001). This positive contribution of stock markets to economic growth is one of the reasons why countries in SSA were encouraged to set up stock markets. There was also the idea that establishment of stock markets was a global pattern and Africa needed to follow suit. Kenny & Moss (1998) note that stock markets were seen as a prestige project that every country needed to have at the time.

To date, despite numerous studies on the topic, there is hardly any consensus on the relative importance of bank-based vs market-based financial systems (Luintel *et al.*, 2008). This has been attributed to a number of reasons which include the use of different indicators to define financial structure, the sample groupings of panel based studies, as well as the methodological approaches used. Panel/cross sectional studies, for example largely show that financial structure does not matter. However, the failure to account for sample heterogeneities is one of the major criticisms of panel based studies. But even if one accounts for panel heterogeneities as in Luintel et al. (2008), there is a lack of consistency between panel based parameter estimates and time series parameter estimates.

This study contributes to the literature by providing additional evidence from SSA on the role of financial structure on economic growth. This is made possible by the availability of the Global Financial Development Database (GFDD), an extensive dataset of financial system characteristics for economies across the globe (Cihak, Demirgüç-Kunt, Feyen, Levine, *et al.*, 2012). The contribution of this study is therefore fourfold. First, it provides empirical evidence from SSA, a region that has not attracted much research interest on the topic. Second, it considers both the short-run and the long-run dynamics of financial structure on economic growth. Third, it accounts for the level of financial development in the analysis. Finally, it accounts for cross country heterogeneity by making use of the Pooled Mean Group

[4] South Africa, Kenya, Nigeria, Zimbabwe and Cote d'Ivoire

(PMG) estimation method of long-run relationships in dynamic heterogeneous panels proposed by (Pesaran et al., 1997, 1999).

The rest of the chapter is organised as follows: Section 2.2 provides an overview of the theoretical and empirical literature on financial structure and growth, section 2.3 covers financial structure in SSA, section 2.4 discusses the data and methodology, while our empirical results are given in section 2.6. Finally, section 2.7 concludes.

2.2 Theoretical and Empirical Literature Review

2.2.1 Theoretical Literature

Theoretically, there are a number of avenues through which development in the financial sector can boost economic growth. First, the financial sector can increase savings, and thereby increased resources available for investment. Second, it could increase productivity of investment as a result of efficient allocation of saving. Third, through monitoring of investments as well as ensuring corporate governance once finance has been provided by financial institutions. Fourth, it can lead to reduction in transaction cost which promotes specialisation, technological innovation and eventually growth (Murinde 2012; Levine 2005; Ghirmay 2004). Both banks and stock markets mobilise savings for eventual allocation to investments. They are also involved in enhancing productivity by pooling consumers' liquidity risk, so that consumers have no need to hold savings in liquid but unproductive investments.

Although they provide similar services, banks and stock markets differ in the way they offer these services. For example, bank-based systems provide inter-temporal risk sharing, whereas cross-sectional risk sharing is provided in market-based systems (Boot and Thakor, 1997). Such differences have led to arguments for a well-developed banking system, while others favour a well-developed market based system. Another difference is in the way banks and markets conduct their transactions. While markets are more arm's length in their transactions with firms, banks closely monitor firms and identify promising entrepreneurships to fund. Banks are therefore directly involved in project selection, making capital from the banking sector more expensive (Ray and Chakraborty, 2003). Despite these differences, there is no theoretical consensus on the merits that accrue to a country in having a bank-based or a market-based financial system (Luintel *et al.*, 2008).

Financial structure is commonly evaluated on the basis of the main competing theories, which include the bank-based theory, market-based theory, financial services theory, and the law and finance view (Levine, 2002; Arestis, Luintel and Luintel, 2004; Luintel *et al.*, 2008). Incorporating financial structure

in modelling growth entails augmenting the classical growth model with measures of financial structure. We explain each theory below.

Bank based theory is anchored in the dominance of the banking system in a country. The advantages of having a bank based system differ for given levels of economic development. For example, it has been argued that, at the early stages of development[5], banks outperform markets (Ray and Chakraborty, 2003). This is because banks are in a better position to resolve agency problems in a system characterized by asymmetric information. This theory therefore advocates for stronger bank based systems rather than market based systems because banks play a more effective role in financing development than financial markets, and more so in developing countries. The argument here is that market based systems reveal information publicly, and therefore investors have no incentive to seek and acquire information. Bank based systems, instead, focus on forming long term relationships that guide their engagements with agents. This results in better resource allocation for banks (Levine, 2002, 2005; Allen and Carletti, 2008). It is also shown that markets are prone to free riders. That is, an outsider may spend time and money looking for information for decision making, and this information is then easily passed on to other investors, making the outsider incur more costs than the rest.

Characteristics to take into account when recommending bank based financial systems include, *inter alia*, the political organisation of the society and the legal and regulatory framework. For example, Bhattacharyya (2013) argues that non-democratic societies have bank based financial systems. This is because non-democratic political rulers can use their power to create monopolistic banks that are beneficial in providing credit to them. Thus, non-democratic societies tend to push for a bank based system. This results in a dominant underdeveloped banking system that is detrimental to growth (Bhattacharyya, 2013). Studies also show that bank based systems tend to dominate in countries with weak legal systems (Rajan and Zingales, 1996).

Market based theories emphasize the dominance of financial markets. The advantages of having a stock market based system is that it encourages specialisation as well as acquisition and dissemination of information. This reduces the costs of mobilising savings and encourages investment (Arestis, Demetriades and Luintel, 2001). Proponents of this type of theory capitalize on the weaknesses of bank based theory, which is pegged on the inefficiencies of large powerful banks. Such banks can hinder the progress of innovation by extracting informational rents and protecting firms with close bank ties from

[5] When a country is transitioning from a traditional economy to an industrialized one

competition, colluding with firm managers against other creditors, and impeding efficient corporate governance (Levine, 2002). These theories claim that such inefficiencies are reduced in market based systems, and, thus, markets are better at enhancing economic growth and development. Another advantage of markets stressed by these theories is that, through the pricing system, they provide information feedback. For example, in equilibrium, prices provide firms with information, which in turn is used by firms to affect future market prices. This is a form of market governance, which has a positive effect on economic performance (Boot and Thakor, 1997).

When stock markets are well developed, they enhance corporate governance by mitigating against principal-agent problems (Arestis, Demetriades and Luintel, 2001). Managers cannot divert funds from the core business of the firm for private gains, and therefore work more towards ensuring profitability. As such, markets rely more on contracts, and the strength of the legal system in enforcing contracts (Tadesse, 2002). However, as noted earlier, in the presence of weak legal systems, banks are preferred. According to Porta, et al. (1998) British legal systems protect private property rights, and thus encourage the development of a market based system. They compare this to the French legal system, which supports a bank based system through supporting a judicial system that is close to redundant, with no protection for private property rights.

The *financial services view* is based on the premise that the source of finance does not matter but instead what matters is the availability and the efficient provision of financial services (Levine, 2002; Arestis, Luintel and Luintel, 2004). This minimizes the importance of the role of banks and financial markets. When the financial system is functioning efficiently, it reduces information asymmetries and risk, and boosts the mobilisation of savings, and leads to efficient capital allocation (Peia and Roszbach, 2014). However, if banks and financial markets are not efficient, the positive effect of finance on the economy cannot be guaranteed. As Beck et al. (2008) note, "...*on the debate between banks and markets, the suggestion that one type of system is clearly better than the other no longer has much support in the literature, whether for access or for financial sector development*" (p.70). The authors further argue that it is far much better to create an environment in which both systems optimise their activities. At the same time, they acknowledge that long term financing is better accessed from relatively large securities markets, while banks are more associated with the availability of short term financing. This suggests that banks and financial markets are not in competition with one another. Given that they are different components of the financial system, they ameliorate different costs, facilitate different transactions and provide different information in the system (Levine, 1997; Boyd and Smith, 1998; Beck, Demirgüç-Kunt

and Levine, 2000; Demirguc-Kunt and Levine, 2001). Governments should therefore be concerned with creating better functioning banks and markets (Levine, 2002).

The literature also shows that banks and markets are substitute sources of corporate finance because, when a firm raises capital by issuing new equity, it reduces its need to borrow from a bank (Arestis, Demetriades and Luintel, 2001). As alluded to earlier, what determines the development of one system as opposed to another is the characteristics and circumstances in a country, and this has a bearing on the effectiveness of the financial system. If banks are better able to handle agency problems than markets, then development of the stock market may hamper growth, especially if the market develops at the expense of the banking system. Whatever system emerges, given country specifics, ought to be able to provide adequate financial services. Therefore, the theory states, the type of financial structure is irrelevant.

A a subset of the financial services view is the *law and finance view*, which borders on enforcement of financial contracts. It emphasizes the need for a strong legal and regulatory framework that can protect the rights of financial players. Theory postulates that an efficient legal system is far better placed to support financial transactions, regardless of whether they are being provided by banks or markets. When property rights are protected and rules and regulations are rightfully enforced, a country's financial system benefits and develops (Porta, et al. 1998; Rajan & Zingales 1996). This development can stem either from the banking system or from the market system, or from both, and the source of financial development is irrelevant. This view therefore concludes that financial development is more likely to occur in an environment that protects the property rights of players in the financial system.

The above theories have given rise to numerous empirical studies that seek to test the validity of each view. The results vary depending on the approach, as well as the indicators used to measure the different aspects of financial structure. These include measures of size, activity, and efficiency of both markets and banks (Beck and Levine, 2002; Levine, 2002; Tadesse, 2002) as well as indicators of laws and regulations (Levine, Loayza and Beck, 2000).

2.2.2 Empirical literature

Overall, cross-sectional studies tend to show that financial structure does not matter for growth (Luintel *et al.*, 2008). Their critics make the observation that these studies do not take account of cross country heterogeneity. These studies show that financial structure is irrelevant in explaining growth, noting that what matters is the level of financial development (See for example Levine (2002)). This view is

supported by results obtained from studies on the effect of financial structure on industry level growth (Beck and Levine, 2002), as well as from studies on the effect of financial structure on investment (Ndikumana, 2005). These studies support the view that banks and stock markets are complementary and not competitors. However, other studies (Tadesse, 2002; Luintel *et al.*, 2008) show that financial structure matters. We explain and evaluate these findings below.

A study by Levine (2002), of 48 developed and less developed countries shows that financial structure is irrelevant in explaining growth, and these results were robust to a number of sensitivity tests, that included different measures of financial structure. This is among the earliest cross-country studies on financial structure and growth, with four countries from SSA, South Africa, Ghana, Kenya, and Zimbabwe included in the study. The author defines overall financial structure as the first principal component of three components of financial structure, namely activity, size, and efficiency. Activity is measured as the activity of the stock market compared to the activity of banks. Size is measured as the size of stock markets compared to that of banks, Efficiency is measured as efficiency of stock markets relative to that of banks. Pinno & Serletis (2007) use the same dataset and variables defined by Levine (2002), and account for cross country heterogeneity by employing Bayesian classification, and find that financial structure matters. Their findings lead them to conclude that market-based systems are more advantageous for developed countries, while bank-based systems benefit developing countries. They explain that their findings differ from those of Levine (2002) because they account for cross country heterogeneity, unlike Levine (2002) who assumes equality of parameters across countries in his study.

The same financial structure indicators are used in Beck & Levine (2002)[6]. Their study examines whether a country's financial structure influences the formation of new establishments, capital allocation, and the growth of industries with different dependence on external finance. Their study is a cross country/cross industry analysis of developed and developing countries. Their sample consists of data from 42 countries and 36 industries averaged between 1980 - 1989, with four countries from SSA, Kenya, Zimbabwe, South Africa, and Nigeria, included in the sample. The authors find that financial structure has no significant impact on industry growth patterns. Rather, industries that rely heavily on external finance grow faster in countries with well-developed financial systems. Classifying a country's financial structure as either bank based or market based is thus not useful for the purpose of promoting industry growth or efficient capital allocation. Countries seeking to promote industry growth should instead focus on ensuring overall financial development, regardless of the source. Ndikumana (2005) comes to a

[6] This is in addition to regulatory restrictions of banks and state ownership of the assets of the ten largest banks

similar conclusion that it is overall financial development that matters, and not whether a country's financial system is bank based or market based.

Contrary to the above findings, Tadesse (2002) using industry level data for a panel of both developed and less developed countries finds that financial structure matters. The author notes that the effectiveness of financial architecture (financial structure) depends on the level of development of the financial sector, and the prevalence and severity of agency problems in the country. Thus, the superiority of a financial system is dependent upon its effectiveness in performing the functions it has been mandated to perform. This means that, in some countries, banks will have a comparative advantage, while in others, markets will have a comparative advantage. The study shows that banks outperform markets in countries with underdeveloped financial systems and in countries dominated by small firms. The opposite holds true, that is, countries with well-developed financial systems do better economically if they are market based than if they are bank based.

Likewise, Luintel et al. (2008) find that financial structure matters in some countries in their sample[7]. Their study compares results from time series analysis with those from panel estimates of the same countries. Using a dynamic heterogeneous panel approach, they estimate the within-dimension parameter estimates and find that financial structure matters for growth. Specifically, their results show that market-based financial systems are more important for growth than bank-based financial systems. Noting the differences between their findings and those of other cross sectional studies, including Beck & Levine (2002); Levine (2002), the authors point to the differences in methodologies and the treatment of cross country heterogeneity, which, if taken into consideration could reconcile the distinctly different sets of results (Luintel *et al.*, 2008)

A number of time series studies on financial structure and economic growth show that financial structure matters for growth (Arestis, Demetriades and Luintel, 2001; Arestis, Luintel and Luintel, 2004; Luintel *et al.*, 2008; Peia and Roszbach, 2014). It has been shown that conclusions from cross country growth regressions may lead to incorrect inferences for the different panel units included in the sample (Arestis, Demetriades and Luintel, 2001). This is because panel based studies mask important country specific characteristics. Parameter heterogeneity across the panel units can also lead to wrong conclusions (Luintel *et al.*, 2008). The authors posit that countries *"exhibit different production structures, levels of banking, financial and capital market development"* (pg.5) necessitating country specific analysis.

[7] Argentina, Brazil, Greece, Mexico, Philippines.

From an empirical analysis of five developed economies, Arestis, et al. (2001) conclude that the effect of banks on growth is more powerful than that of stock markets. They posit that the effect of stock markets may have been exaggerated by studies that utilize cross country growth regressions. They use the log of stock market capitalisation and the log of domestic bank credit as ratios of GDP, to account for stock market and banking sector development respectively. They argue that cross country growth regressions can only provide a general view on the relationship between finance and growth, and this can vary when considering individual countries. Arestis, et al. (2004) conclude that financial structures can have a significant effect on the level of output in some countries but not in others, in their analysis of a sample of six developing countries. They show that market based systems were more conducive for growth in Greece, Taiwan, South Korea and India, while a bank-based system was more conducive for growth in South Africa. Their study showed that, in the case of Philippines, however, financial structure was insignificant in explaining growth.

Reviewing the empirical literature, it becomes obvious that conflicting conclusions have been reached, based on the methodologies used as well as the assumptions of either homogeneity or heterogeneity made concerning the countries used in study samples. This study takes into consideration the shortcomings of previous studies, including cross country heterogeneity overlooked by Levine (2002) and Beck & Levine (2002), but considered in Luintel et al. (2008) and Pinno & Serletis (2007). It also takes into account both long-run and short-run dynamics. The study focuses on SSA countries, classified as predominantly bank-based and influenced by similar technologies, and makes the assumption of a common long-run relationship between financial structure and economic growth plausible, while allowing the convergence dynamics of the long-run and the short-run to differ. This is made possible by the use of the pooled mean group estimation method by Pesaran et al. (1999) and Pesaran & Smith, (1995), which combines average and pooling methods of panel data estimation.

2.3 Financial structure in Sub-Saharan Africa

SSA consists of 48 countries most of which are characterised by underdeveloped financial systems. The majority of the financial systems were inherited from the countries' former colonies. South Africa and Mauritius are exceptions, given their more developed financial systems. In the years after independence[8], many of the financial systems were characterised by financial repression, directed credit and state ownership of financial institutions, mostly banks. The majority of the countries did not have stock markets and non-bank financial institutions like insurance companies, mutual funds, pension funds, and

[8] Most countries in SSA gained independence in the early to mid-1960s

development banks. Most stock markets in Sub Saharan Africa were established after 1989 (Yartey and Adjasi, 2007). Prior to this date, there were only five stock markets in SSA (South Africa, Nigeria, Kenya, Zimbabwe, and Cote d'Ivoire). A large proportion of the population was un-banked, and in those countries with stock markets, Africans were not allowed to participate in these markets (Allen et al., 2011). This changed with the extensive privatisation of state-owned banks, following the structural adjustment programmes of the World Bank in the mid-1980s, and the liberalisation of financial systems, which led to financial deepening, emergence of new products as well as the use of new technologies (Honohan and Beck, 2007).

The financial structure of the majority of SSA countries is still dominated by the banking sector, with very low trading activity in financial markets (Standley, 2010). The stock markets are still characterised as immature, despite having been in existence for over two decades. In the last decade however, effort has been geared towards developing, deepening and integrating existing stock markets, as well as creating new markets. Even though the financial sector in SSA is characterised as bank-based, this is not because the banking sector is significantly well developed. Nyantakyi & Sy (2015) note that banks in Africa are shallower, with a limited network presence compared to other regions. Financial development, measured by the ratio of domestic credit available to the private sector by deposit taking institutions compared to economic activity, was estimated at an average of 24 percent in 2014. The observation that the financial sector in SSA is bank-based is therefore in relation to the underdevelopment in the financial markets.

Beck, et al. (2009) compare financial structures in developing countries with those in high income countries. They note that the trend in high income countries is towards market-based financial systems, where markets are seen to deepen more than banks. However, they note that there has been no such trend in the bank-based financial systems in developing countries. Financial sectors in SSA countries are among the least developed in the world. Foreign banks have played a major role in the development of the SSA banking sector (Allen, Otchere and Senbet, 2011) while stock markets play a minimal role.

Information technologies, especially the use of mobile phones for mobile banking, are revolutionising banking in countries like Kenya, Uganda and Ghana. Thus, financial systems in SSA are experiencing changes in quality as well as quantity, leading researchers to evaluate the impact that this might have on economic growth. As banks and stock markets constitute the bulk of financial systems in SSA, we provide a detailed description of their evolution within the region. To put the regions' financial structure into perspective, we present a comparative analysis of the characteristics of financial structures of

developing regions over 1988 -2014, as well as those of the financial structures of the OECD, as a representative of high income developed countries.

2.3.1 Banking in SSA

Many countries in the SSA region inherited financial systems from their colonisers, and are dominated by foreign banks that were largely designed to serve colonial interests. Post-colonial governments embarked on nationalisation of existing banks, and set up new banks to address the developmental needs of their independent countries. To achieve this, interest rates were kept low and credit was directed to priority sectors (Fowowe, 2013). However, by the early 1990s, after on average more than 20 years of independence, their financial systems were described in the 1990s as shallow, narrow, and undiversified (Popiel, 1994). This was after financial reforms in the mid 1980s. Low lending rates, credit ceilings, and credit directed to priority areas meant that bank profit margins were low and credit was not being efficiently allocated. Many countries faced deteriorating economic conditions, macro-financial instability, fiscal imbalances, and financial distress.

The banking sector in SSA expanded rapidly from the early 2000s. Reforms, including financial liberalisation, the reduced role of government in deciding pricing, and allocating credit, and improvements in the institutional environment are among the major contributors to these changing dynamics (Marchettini, Mecagni and Maino, Rodolfo, 2015). In the recent past, the region has experienced rapid economic growth given the prevailing favourable macroeconomic policies. Increased financial activity in SSA, coupled with improved regulation, has led to significant growth in the financial sector, with marked expansion of access to financial services. A major feature of the financial sector in SSA is the dominance of banking services, with commercial banks forming the backbone of financial services (KPMG, 2015; Marchettini, Mecagni and Maino, Rodolfo, 2015; Nyantakyi and Sy, 2015). A notable feature among banking systems in Africa is their preference to purchase government securities rather than provide credit to the private sector (Allen, Otchere and Senbet, 2011; KPMG, 2015). While banks do this mainly to avoid bad credit and remain profitable, it is seen as a hindrance to financial development, measured by the ratio of credit to the private sector to GDP. However, country specific conditions influence the flow of private credit. These include the size and diversification of the economy, macroeconomic conditions and the availability of natural resources (Marchettini, Mecagni and Maino, Rodolfo, 2015). We therefore expects to see large heterogeneities in lending flows across SSA.

Foreign banks still have a strong presence in SSA, and the recent years have seen a rapid growth in Pan African banks (Marchettini, Mecagni and Maino, Rodolfo, 2015). Reports show that foreign banks play

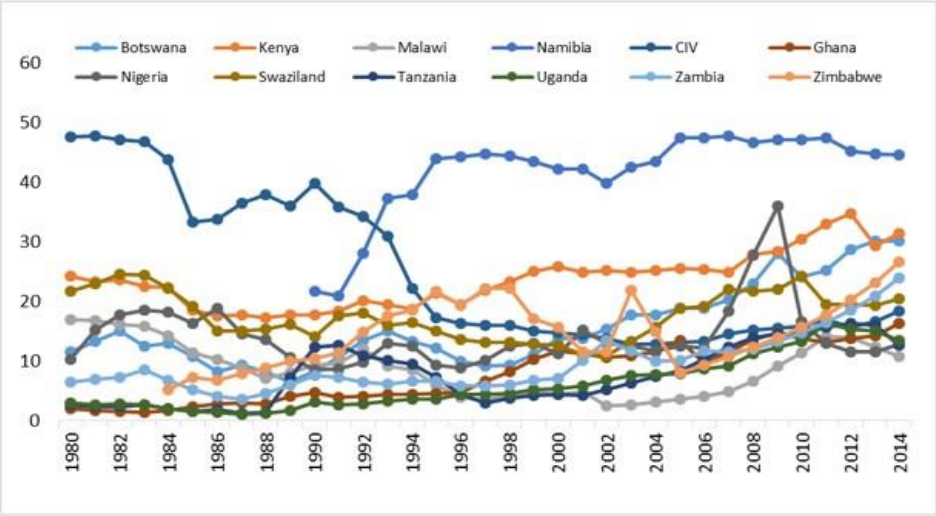
a significant role in strengthening competition and promoting good governance and innovations in domestic banks. Foreign banks have also increased lending activities in SSA (Allen, Otchere and Senbet, 2011; Nyantakyi and Sy, 2015). This is because foreign and private banks are considered more efficient than public domestic banks in SSA. Pan African banks, on the other hand, have been instrumental in bridging the financing gap created by the scaling back of European banks caused by the global financial crisis. The increased role of Pan African banks is also reflected in their taking the lead in the arrangement of syndicated loans in the region (Marchettini, Mecagni and Maino, Rodolfo, 2015).

The penetration of the banking sector has deepened, albeit at a slow pace, in many countries in the region. Figure 2-1a shows trends in the ratio of private credit by deposit money banks to GDP for selected countries[9]. This ratio is often used as an indicator for the level of development in the banking sector. It is evident that in the late 1980s and early 1990s, there was a rapid development of financial systems in the sample countries, largely attributed to financial liberalisation policies. However, it was not until 2001 that a remarkable increase in financial development was seen in the region. Mauritius and South Africa are more financially developed than other countries in the region, as seen in figure 2-1b. With ratios of private credit by deposit money banks to GDP averaging at 51% and 59% respectively, their financial sectors are substantially more developed than the other countries in the sample. Financial development in South Africa dominated the region until about 2008. However, since the global financial crisis of 2007/2008, South Africa has experienced a decline in the ratio of private credit by deposit money banks to GDP, while Mauritius has continued to recorded increases. The growth in credit to the private sector has largely been attributed to an increase in prices of commodity exports from SSA and an increase in private capital flows. This is in addition to macroeconomic stabilisation. The rising trend in credit to the private sector is expected to continue, alongside stable macroeconomic environments and continued reforms in the financial sector.

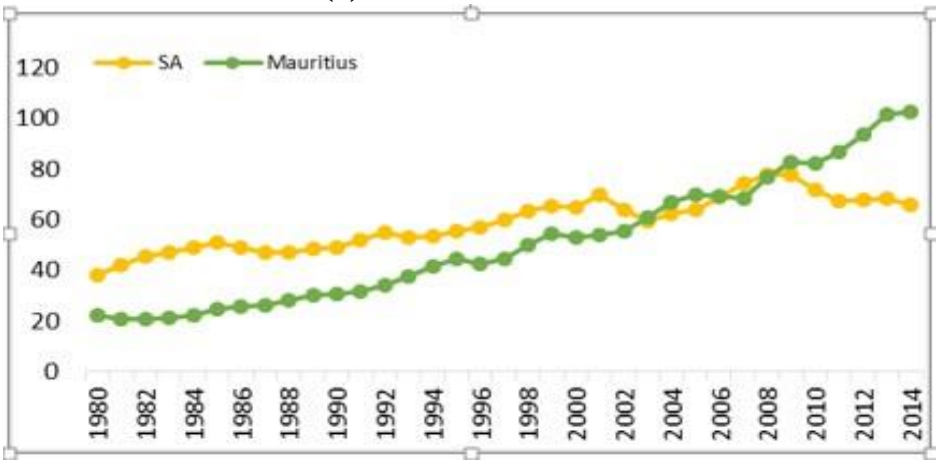
[9] The selection of countries was limited to countries with functional stock markets, to enable comparison of stock market developments

Figure 2-1: Ratio of Private Credit by Deposit Money Banks to GDP (%)

(a) Excluding South Africa and Mauritius



(b) South Africa and Mauritius

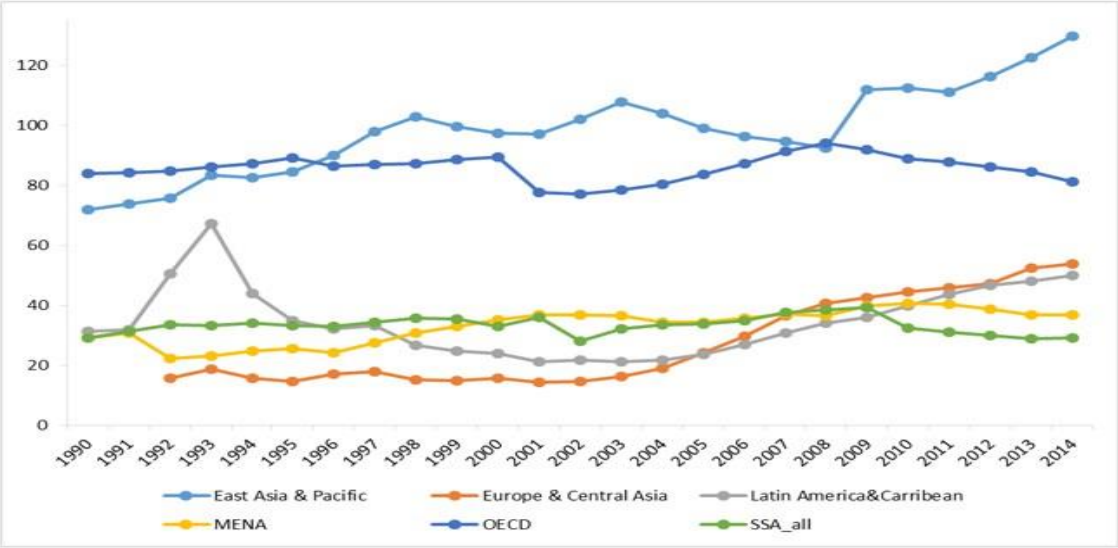


Source: Global Financial Development Database (GFDD) - 2016

Despite the growth in banking in SSA, the gap between SSA and the rest of the world, in terms of the depth of the financial sector, seems to have widened (KPMG, 2015). Figure 2-2 shows how the ratio of private credit by deposit money banks to GDP in SSA compares to that of other developing regions, and the OECD as a representative of high income developed countries. It can be seen that countries in SSA perform worse than the OECD and developing countries in East Asia & Pacific. However, the region compares well with the Middle East and North Africa (MENA) region and performs better than Latin America, the Caribbean, Europe and Central Asia until 2009. Overall, though, the depth of the financial sector in SSA is the shallowest, and has been declining since 2009.

Reasons for the decline in the ratio of private credit by deposit money banks to GDP in SSA is the absence of strong legal institutions, and a lack of support for creditor rights. These lead to shallow financial sectors, with limited penetration of banking services (Nyantakyi and Sy, 2015). To address the limited penetration of banking services, countries have resorted to innovative approaches to banking, which include mobile money accounts facilitated by the penetration of mobile telephony in the region. Kenya leads the way in mobile money accounts, which has allowed financial institutions in the country to reach a wider clientele. Other countries that have high usage of mobile money accounts include Botswana, Cote d'Ivoire, Rwanda, South Africa, Tanzania, Uganda, and Zimbabwe. The practice is, however, spreading across the region as countries have embraced it in a bid to expand financial inclusion. It is also expected that the rapid rise in Pan African banking, that is replacing the vacuum left by European banks after the global financial crisis will reverse this decline in credit to the private sector (Marchettini, Mecagni and Maino, Rodolfo, 2015).

Figure 2-2: Private credit by deposit money banks to GDP (%): Comparison with other developing regions and OECD



Source: World Development Indicators, 2015

2.3.2 Stock markets in SSA

As noted earlier, not all countries in SSA have stock markets and many of the stock markets in SSA were only established in the late 1980s to early 1990s. Exceptions are South Africa, Zimbabwe, Kenya, Nigeria and Cote d'Ivoire[10] whose markets were established in 1887, 1946, 1954, 1961, and 1976 respectively. A number of reasons have been given to justify establishing stock markets in SSA. Besides

[10] Cote d'Ivoire currently serves as a regional stock market for the West African region

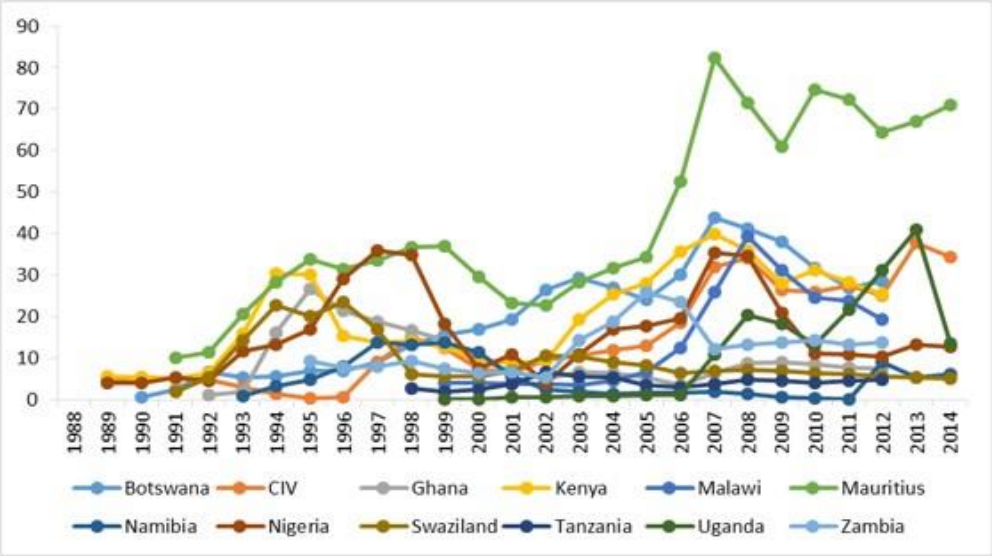
the view that establishment of stock markets is a global trend and SSA countries should not be left behind, stock market development is seen as a natural progression of a financial sector development (Singh, 1991). It is also an avenue through which developing countries can attract foreign portfolio investments. Nevertheless, stock markets in SSA have not experienced the same developments as developed and emerging economies. This has partly been attributed to a weak financial infrastructure, fear of political upheavals, bureaucratic inertia with weak regulation and slow clearance procedures, limited choice of companies to invest in due to limited listings and a lack of domestic participation. Domestic participation is thought to be one way to boost credibility of stock markets and act as a cushion against external capital flows (Kenny and Moss, 1998). Addressing the above issues could lead to investor confidence, thus, boosting active participation in the stock markets.

Figures 2-3a and 2-3b show the trend in market capitalisation and value traded as ratios of GDP respectively. There has been an increase in the total value of the shares listed in the various stock markets, as seen by the ratio of stock market capitalisation. For example, the ratio increased from around 7 percent to 29 percent in Botswana between 1992 and 2012. During the same period, it increased from 6 percent to 25 percent in Kenya and 1.2 percent to 8 percent in Ghana. However, there was a significant drop in stock market capitalisation for most countries in 2007/2008, which coincides with the global financial crisis. South Africa dominates other countries, with an average of 176% during the same period (see note for the figure). The average stock market capitalisation relative to economic activity for the sample countries (including South Africa and Mauritius) is 30 percent. However, it is a mere 18 percent when we exclude South Africa and Mauritius.

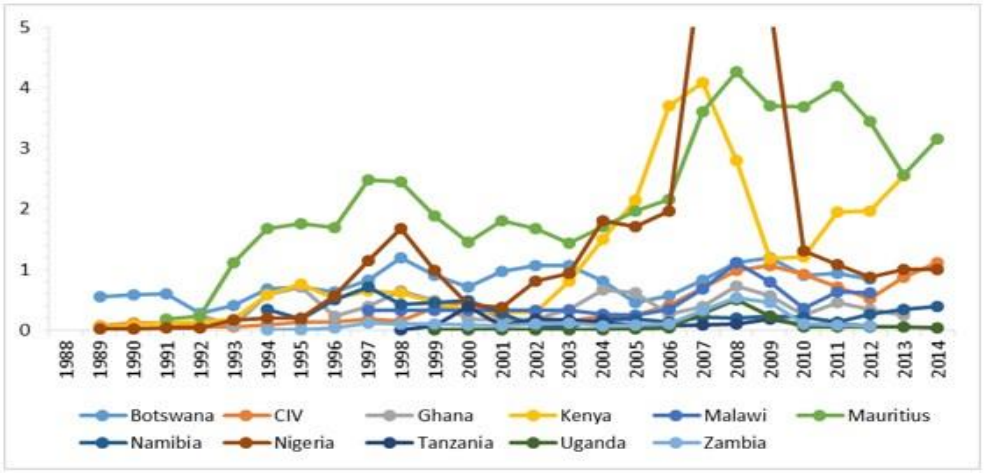
Stock market activity (measured by the ratio of stock market value traded to GDP) is also dismal in almost all markets. Figure 3b shows that, on average, stock market value traded relative to GDP is below 5 percent. South Africa is exceptional, with an average ratio of stock market value traded relative to GDP of 39 percent (not shown on graph). Kenya has an average of 1.2 percent, while in Nigeria, the average is 2.13 per cent. Another feature of stock markets in SSA is the high volatility of trades. For example, while the average for the whole period in Nigeria is 2.13 per cent, it recorded a value traded of 9 percent of GDP in 2008, but this fell to 1.3 percent in 2010. Likewise, Zimbabwe had an average value traded of 39 percent in 2002, which dropped to 2.3 percent in 2004.

Figure 2-3: Ratio of Stock Market Capitalisation and Value traded to GDP (%)

(a) Ratio of Stock Market Capitalisation to GDP (%)



(b) Ratio of Stock Market Value Traded to GDP (%)



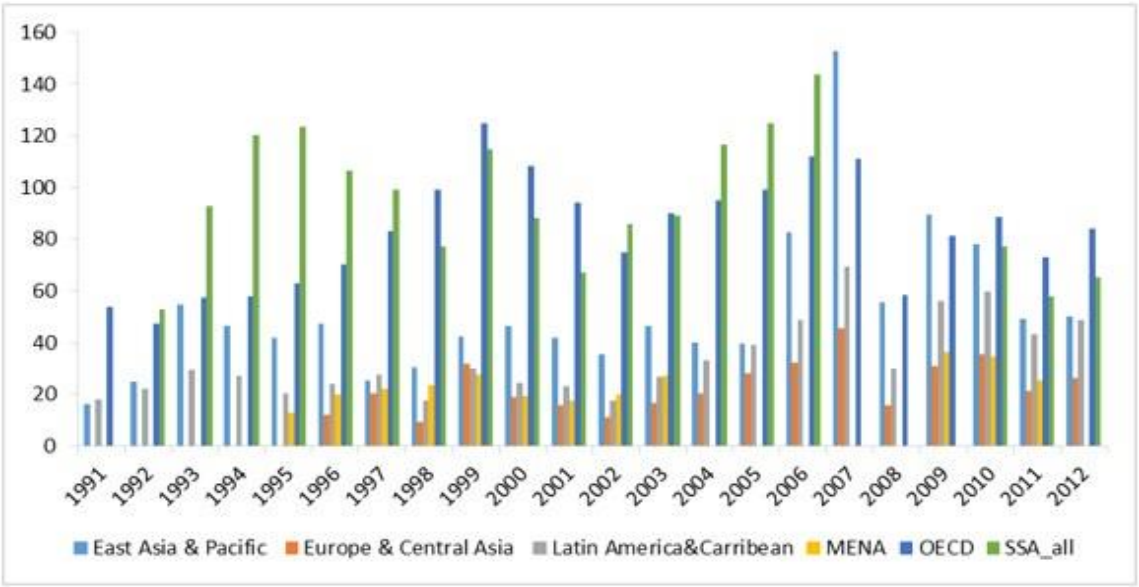
Source: Global Financial Development Database, 2016

We have excluded South Africa and Zimbabwe in fig 3a because i) South Africa has very high values and ii) Zimbabwe has two extreme data points, making the graph unreadable. In Fig 3b, we also exclude South Africa and Zimbabwe for the same reasons, and exclude Swaziland for an extreme data point in 1997 that distorts the graph. These graphs for South Africa are presented in appendix A.4. We also allow one data point for Nigeria to extend above the graph to make the graph readable. These data points, are however, not excluded from the analysis

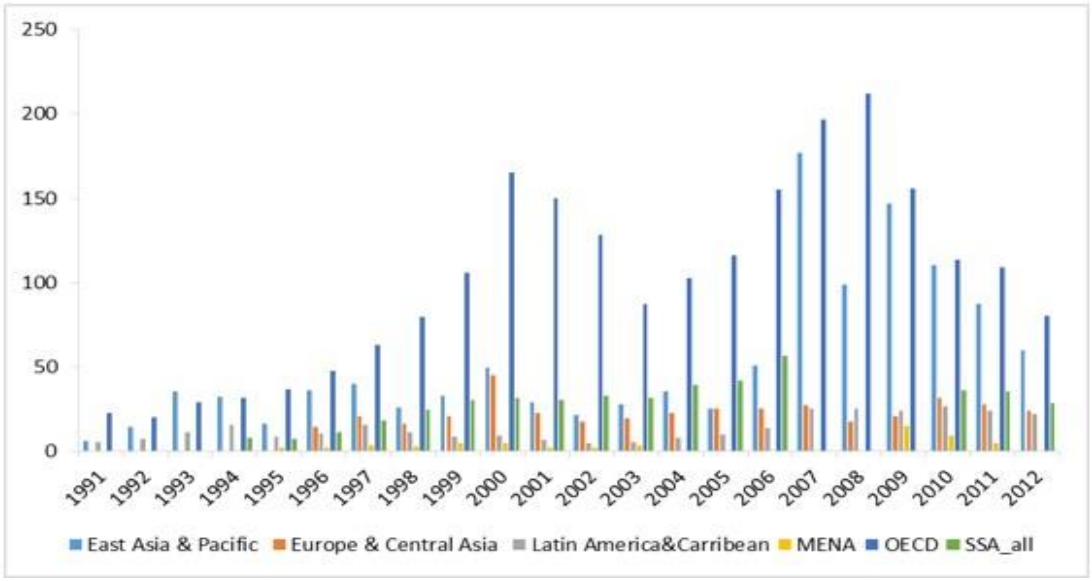
Compared to other developing regions and the OECD (see figures 2-4a and b), SSA seems to be better capitalised than the other developing regions but less so than the OECD. What is most notable is that even though SSA is better capitalised than East Asia and the Pacific, the latter has more active markets than SSA, as seen in the ratio of stock market value traded to GDP (figure 2-4b). This illustrates the observation that countries can have large but relatively inactive stock markets (Levine and others, 1999).

Figure 2-4: Comparison of stock market indicators

(a) Stock market capitalisation (% of GDP): Comparison with other developing regions and OECD



(b) Stock market value traded (% of GDP): Comparison with other developing regions and OECD



Source: World Development Indicators

From the figure 2.4, it is evident that countries in SSA have seen a remarked increase in the size of their stock markets (as measured by the ratio of stock market capitalisation to GDP), which has been higher than other developing countries. However, excluding South Africa and Mauritius, banking sector development is more rapid, with the ratio of private credit by deposit money banks to GDP averaging 21%, compared to the ratio of stock market capitalisation to GDP, which has an average ratio of 18%.

This implies that the financial sector in the region is more bank-based. When we compare stock market activity with banking sector activity, we also find that the dismal activity in stock markets, despite their size, is an indication of more reliance on the banking sector. It is because of the underdevelopment of the stock markets in most of the countries that banks tend to play the primary role in their financial systems. Should developments in the stock markets continue at the pace recorded after 2000, there is a possibility that countries could see a move towards more market-based financial systems. However, this has to go hand in hand with a strengthened financial infrastructure, enforcement of financial laws and regulations, and macroeconomic and political stability.

The above analysis also shows that, despite the generalisations of financial sectors in SSA, there are marked heterogeneities, with South Africa and Mauritius having more developed financial systems relative to the other countries in the sample. It will therefore be important in our analysis to exclude the two countries, for a robustness check.

2.4 Model specification, Methodology and Data

2.4.1 Model specification and methodology

To empirically examine the long-run relationship between growth and financial structure, we adopt a standard growth model, following the work of Levine (2002). The standard growth model establishes a behavioural relationship among the variables of interest, from which we can derive a production function. Where *A* is a measure of technological efficiency. In order to identify the role of financial structure (FS), we augment the above equation with indicators of financial structure. Expressing the relationship between economic growth and financial structure in equation form gives us equation (2-1) below.

$$y_{it} = \beta_0 + \beta_1 FS_{it} + \beta_2 X_{it} + \varepsilon_{it} \qquad (2\text{-}1)$$

Where; i = 1,2.....N and t = 1,2.....T

FS_{it} = financial structure

X_{it} = control variables

ε_{it} = the error term.

Equation (2-1) is our estimation equation and, from it, we are interested in both the sign and significance of β_1 as FS_{it} is our key indicator variable for financial structure. A significant β_1 implies that financial structure matters for growth. A positive and significant coefficient implies that a market based system is more important for growth than a bank based system. A negative and significant sign implies that a bank

based system is more important for growth than a market based system (Levine, 2002; Luintel *et al.*, 2008).

Several indicators have been used in the literature as proxies for the banking sector and stock market development. Given the lack of consensus on the best measures of bank and stock market development, studies have relied on indicators that approximate different aspects of these two channels (Gambacorta, Yang and Tsatsaronis, 2014). The indicator of financial structure captures the development of both the banking system and the stock market. The most commonly used indicator from the banking sector is the ratio of private credit by deposit money banks to GDP (%) (PCR). The ratio of stock market capitalisation to GDP (%) (Mktcap) as a measure of the size of the stock market, and the ratio of stock market value traded to GDP (%) (Vtraded) as a measure of stock market activity are the most commonly used indicators for the stock market (See for example Arestis et al. (2004); Beck & Levine (2002); Levine (2002); Luintel et al. (2008)).

The two components of the financial structure used in this study are financial structure size (FSsize) and financial structure activity (FSactivity) and are derived as shown below:

$$FSsize_{it} = log\left(\frac{Mktcap_{it}}{PCR_{it}}\right) \tag{2-2}$$

$$FSactivity_{it} = log\left(\frac{Vtraded_{it}}{PCR_{it}}\right) \tag{2-3}$$

Where;

$mktcap$ is the ratio of stock market capitalisation to GDP

$vtraded$ is the ratio of stock market value traded to GDP

PCR is the ratio of private credit by deposit money banks to GDP

There are different ways to obtain the overall index from the above components, including taking the first principal component as done by (Beck, Maksimovic, Demirgüç-Kunt, & Levine, (2000); Levine, (2002); Luintel et al. (2008). For this study, we use equation (2-4) below, adopted from D. S. Allen & Ndikumana (2000)[11]. This method is preferred to the first principal component method, as the latter assumes that the direction with the largest variance is the most important. It is thus difficult to tell which component is contributing the most to the index.

[11] The authors use the equation to obtain an aggregate measure of financial development

$$FSindex_{it} = \frac{1}{m}\sum_{j=1}^{m}\left\{100 * \frac{FS_{jit}}{\overline{FS_j}}\right\} \quad (2\text{-}4)$$

Where j = 1, 2; i = 1 ,2.....,N

FS_{it} is the respective component of financial structure (size and activity)

$\overline{FS_j}$ is the sample mean of FS_{it}

m is the total number of indicators used to generate the overall financial structure. Larger values for the $FSindex$ indicate a more market-based financial system.

Establishing the determinants of growth is an open ended research agenda, and Levine & Renelt (1992) note that there is no consensus on a conditioning set of explanatory variables in growth regressions. They highlight over 50 explanatory variables identified in the literature. However, researchers generally use only a small subset of these. Growth related empirical studies predict that, besides capital and labour, as used in the Solow model (Solow, 1956), there are other factors that affect growth in a country. These explanatory variables include fiscal policy variables, e.g. government expenditure, investment, trade policy indicators, e.g. exports, imports and exchange rate, and monetary and political indicators e.g. inflation, coups and revolutions, black market premium. (Mankiw, Romer, & Weil (1990) and Romer, (1990) also include human capital in their estimation. For example, in Africa the lack of trade openness, low levels of social capital, poor infrastructure, and high risk environment have been found to slow growth (Collier and Gunning, 1999). Other indicators include extent of democracy and rule of law, fertility rates, life expectancy, infrastructure, ethnic strife, restrictive financial infrastructure, and human and physical capital (Kenny and Moss, 1998; Kodongo and Ojah, 2016). It is therefore important that our control variables include these specific indicators.

Hence, for this study, and based on data availability, we include life expectancy (*lexpectancy*) to proxy human capital, and democracy and rule of law (*polity*), government consumption (*Govcons*) to proxy for the size of government, degree of openness in a country (*Openness*), and inflation (*infl*) to proxy for macroeconomic stability. From equation (2-1), and incorporating our conditioning set, the empirical model to be estimated is expressed as;

$$yit = \beta_0 + \beta_1 Govcons_{it} + \beta_2 Open_{it} + \beta_3 infl_{it} + \beta_4 lxepectancy_{it} + \beta_5 FS_{it} + \nu_{it} \quad (2\text{-}5)$$

The literature suggests that more financially developed countries tend to be more market-based. We therefore control for the level of financial development in our estimation, to check if financial development absorbs some of the effects of financial structure. This will be tested by estimating equation (2-6) below.

$$yit = \beta_0 + \beta_1 govcons_{it} + \beta_2 Open_{it} + \beta_3 infl_{it} + \beta_4 lepectancy_{it} + \beta_5 FS_{it} + \beta_6 FD_{it} + \upsilon_{it} \quad (2\text{-}6)$$

FD_{it} captures the level of financial development and, as in Levine (2002), this study makes use of the ratio of credit to the private sector by deposit money banks to GDP as a proxy for financial development.

In choosing the most appropriate estimation method, the Generalised Method of Moments (GMM) and the Auto Regressive Distributed Lag (ARDL) were considered due to their applicability in dynamic panel estimation. However, the GMM method yields inconsistent estimates when the variables are non-stationary compared to the ARDL method, which produces consistent results, irrespective of whether the variables are I (0) or I (1). Moreover, while the GMM method is most suitable in panels with small T compared to the ARDL, Pesaran et al. (1999) consider the application of the ARDL method when both panel dynamics (N and T) are small, and point out that the choice of the lag order is very important for such an application. For these reasons, the ARDL method was the most preferred and was therefore used for the study.

The ARDL specification allows for a dynamic structure of the model, and is commonly used for estimating both short run and long run dynamics. To determine the appropriate lag length, we make use of the Akaike Information Criteria (AIC) and the Bayesian Information Criteria (BIC). Based on these lag selection criteria, and assuming an ARDL (1,1,1,1,1,1), equation (2-1) can be rewritten in its dynamic form to yield equation (2-7) (For notation purposes, we denote all the control variables as *X*).

$$y_{it} = \alpha_0 + \lambda_i y_{it-1} + \delta_{10} X_{it} + \delta_{11} X_{it-1} + \delta_{20} FS_{it} + \delta_{21} FS_{it-1} + \varepsilon_{it} \quad (2\text{-}7)$$

Expressing the above equation in its error correction form yields;

$$\Delta y_{it} = \varphi(y_{it-1} - \theta_0 - \theta_1 X_{it} - \theta_2 FS_{it}) + \delta_{10} \Delta X_{it} + \delta_{20} \Delta FS_{it} + \varepsilon_{it} \quad (2\text{-}8)$$

Where;

$\phi_i = -(1-\lambda)$; $\theta_0 = \frac{\alpha}{1-\lambda}$; $\theta_1 = \frac{\delta_{10}+\delta_{11}}{1-\lambda}$; $\theta_2 = \frac{\delta_{20}+\delta_{21}}{1-\lambda}$; Δ Denotes first differences; ε_{it} = the error term; and φ = Error correction term (ECT); θ = long-run elasticities, and δ_i = the short-run coefficients.

For a long-run relationship to exist, $\varphi \neq 0$ (Pesaran, Shin and Smith, 1999). Its magnitude represents the speed of adjustment back to the long-run after a change in one of the explanatory variables.

The above model requires that the error term, ε_{it} is independently distributed across time and across the group, and that it bears the usual assumption of zero mean and constant variance. A number of procedures have been developed that enable researchers to estimate the average long-run effects in panel data, as discussed in (Hsiao, Pesaran, Lahiri & Lee (Eds) (1999). These methods include i) Estimating separate regressions for each group and averaging the long-run coefficients over groups (Mean Group (MG) Estimation), ii) Pooling separate regressions by imposing a common slope, where the long-run relationship is estimated using fixed or random effects pooled regression, iii) Averaging the data over groups and estimating aggregate time-series regressions based on group averages, and iv) Averaging the data over time and estimating cross section regressions based on long time averages. However, these methods face a number of shortcomings. Pesaran & Smith (1995) show that the pooled and the aggregate time-series estimators are not consistent in dynamic heterogeneous panels even for large T and large N. Furthermore, Pesaran, Smith, & Im, (1996) show that the MG estimator does not take into account the panel dimensions of the data, and could therefore be seriously biased for small T, especially when T is small relative to N. Similarly, the pooled estimation methods can produce inconsistent and potentially misleading estimates of the average values of the parameters in dynamic models, unless the slope coefficients are identical.

Pesaran et al. (1999) propose an intermediate method, the pooled mean group (PMG) estimator. This, considers both pooling and averaging so that it allows the short-run coefficients to vary across countries, while restricting the long-run coefficients to homogeneity. The rationale for this estimator is that there are good enough reasons to expect the long-run equilibrium relationships between variables to be similar across groups. Its applicability in the Solow growth model is justified by the assumption that countries are exposed to the same technologies, making the long-run production function parameters similar. The estimator is based on maximum likelihood estimation and assumes that variables are either I (1) or I (0).

The PMG estimator is suitable when both the number of cross sections and time periods are large. However, Pesaran et al. (1999) consider its application when both panel dynamics (N and T) are small,

and point out that the choice of the lag order is very important for such an application. These features of the PMG estimator thus make it more appealing for application in this study. Nevertheless, the homogeneity restrictions of the long-run coefficients will be tested using the Hausman specification test. This will entail comparing the MG and the PMG coefficient estimations. Pesaran et al. (1999) note that the PMG estimator is consistent and more efficient than the MG estimator, provided the homogeneity assumption holds. If this assumption does not hold, the MG estimator is more efficient. In both cases, the MG estimators are consistent.

Panel unit root test

The ARDL method does not require pretesting the data for the presence of unit roots, because the PMG estimator produces consistent results, irrespective of whether the variables are I (0) or I (1). But this is not the case if integration is higher than 1. In order to confirm the absence of I (2) variables, we use the Fisher-Augmented Dickey Fuller (ADF) and Fisher-Phillips Perron (PP) tests to test for panel unit roots. The advantage of the Fisher type test is that it does not require a balanced panel required by other tests[12]. The basic framework is given by;

$$\Delta y_{it} = \alpha_i + \rho_i y_{it-1} + \varepsilon_{it} \tag{2-9}$$

Where;

$H_0: \rho_i = 0 \; \forall_i$ and $H_1: \rho_i < 0$;

$i = 1,2, \ldots . . N; \; \rho_i = 0, i = N_1 + 1, N_1 + 2, \ldots . . N$

The Fisher type test entails combining the ρ values from the individual panels using the method proposed by Choi (2001) and Maddala and Wu (2001) as cited in Baltagi (2005), to obtain an overall test statistic. The test is then given by;

$$P = -2 \sum_{i=1}^{N} \ln \rho_i \tag{2-10}$$

[12] For example, the test by Im, Pesaran and Shin (IPS), Levin-Lin-chu (LLC).

The combined ρ-values from the unit root tests for each cross section are then used to test the unit root for the panel. If the ρ-value obtained is less than 0.05, then we reject the null hypothesis that the series is stationary at the 5% level of significance.

2.4.2 Data

The data used in this study is for a panel of 14 countries from SSA for the period 1980 - 2014, obtained from the World Bank's World Development Indicators (WDI) and the Global Financial Development Database (GFDD). As stock market data for some countries is not available for the whole time period, the actual length of data ranges from 15 to 34 years, with an average of 22 years. As noted by (Pesaran et al. (1999), the time period must be long enough to allow for time-series estimations for each country, but need not be the same time period for each country. We therefore proceed with an unbalanced panel. The list of countries included in the study is provided in appendix A.2.

Our estimation includes economic and financial variables. Economic data, which constitutes our control variables, is obtained from WDI, while financial data is obtained from GFDD. The advantage of obtaining financial data from the GFDD is that it has already been adjusted to account for stock and flow variables, which has been a flaw in previous literature on financial structure and growth, e.g Levine, (2002). The main variables of interest for this study include logged real per capita GDP, which is our proxy for economic growth, private credit by deposit money banks to GDP (%) (PCR) from the banking sector, stock market capitalisation to GDP (%) (Mktcap), and stock market value traded to GDP (%) (Vtraded) from the stock market. Variables from the banking sector and the stock market will be used in the construction of our financial structure indicator. Our measure of democracy and rule of law (polity) is obtained from Polity IV, and is a measure of a country's governance system.
Further details about the data, sources and descriptions are provided in appendix A.1.

2.4.3 Descriptive statistics

As noted earlier, SSA is characterised by low levels of financial development, and this can be seen from the low ratios of the financial variables displayed in table 2-1. For example, the average ratio of private credit by deposit money banks to GDP (PCR) is 25% and ranges from 3% to 102%. This wide disparity is because the sample includes 5 countries[13] with averages of less than or equal to 10%, and South Africa and Mauritius, which have average ratios of 58% and 62% respectively. This is a reflection of the wide

[13] Ghana, Malawi, Tanzania, Uganda, and Zambia

disparities in the levels of financial development in the region. The same disparities are displayed in the level of stock market development, as seen in the ratios of stock market capitalization (Mktcap) and stock market value traded to GDP (Vtraded). For example, Mktcap ranges from 0.01% to 488%. It is important to note that this extreme maximum value reflects an extreme value in Zimbabwe recorded in 2006 which will exaggerate the average stock market capitalisation. Stock market value traded, on the other hand, ranges from 0% (no activity) to the active South African stock market. The sample used in this study therefore consists of countries with different characteristics driven by different policies, and diverse historical backgrounds. The standard deviations show high variation in the real per capita GDP which further implies large differences in the income levels of the sample, which accounts for heterogeneity in our estimations.

Table 2-1: Descriptive statistics

Variable	N	Mean	SD	Min	Max
RPCGDP	323	2,082.78	2,050.86	205.43	7,116.59
PCR	323	25.06	20.41	2.59	102.54
Mktcap	323	35.78	56.53	0.01	487.82
Vtraded	323	4.58	12.39	0	75.47
FSindex	323	3.82	1.3	-0.27	7.59
Inflation	323	94.23	1,359.00	-0.81	24,411.00
Life expectancy	323	54.9	7.48	40.68	74.19
Govcons	321	15.63	5.01	2.05	30.07
Openness	323	77.01	30.79	30.89	202.85
Polity	323	2.46	5.9	-9	10

RPCGDP=Real per capita GDP in constant 2005 US dollars, PCR = private credit by deposit money banks to GDP(%), Openness=trade openness (ratio of exports + imports to GDP), Polity=measure of democracy ranging from -10 (least democratic) to 10 (most democratic), Mktcap=Stock market capitalisation to GDP(%), Vtraded= Stock market value traded to GDP(%)

The correlation coefficients (appendix A.3) display the relationship between the explanatory variables and per capita GDP. Real per capita GDP and private credit by deposit money banks (PCR), stock market value traded (Vtraded) and stock market capitalization (Mktcap) are positively and significantly correlated. This positive correlation implies that developments in the banking sector as well as in the stock markets may have a positive effect on growth. However, correlation may not always imply causation, and further analysis is required to establish if this positive correlation is indeed an indication of positive effects of finance on growth.

The results of the stationarity test shown in table 2-2 show that our data contains both I(0) and I(1) variables. This is an indication that we have both stationary and non-stationary variables. We employ both the ADF and the PP tests, with the ADF showing that FSindex, inflation, life expectancy, and

government consumption are all stationary with real per capita GDP, PCR and openness 1st difference stationary. The Phillip-Perron, however, shows that FSindex and life expectancy are not stationary.

Table 2-2: Unit root test results

	ADF			PP		
Variable	Level	1st difference	Order of integration	Level	1st difference	Order of integration
RPCGDP	5.2904	-6.6646***	I(1)	5.5731	-10.6785***	I(1)
	-1.000	0.000		-1.000	0.000	
FSIndex	-2.6190***		I(0)	-0.8329	-9.7763***	I(1)
	-0.0044			-0.2024	0.000	
PCR	-1.0408	-10.9709***	I(1)	-0.6633	-12.1580***	I(1)
	-0.149	0.000		-0.2536	0.000	
INFLATION	-5.9001***		I(0)	-6.8754***		I(0)
	0.000			0.000		
LIFE EXPECTANCY	-22.0226***		I(0)	3.6064	0.7133	
	0.00			-0.9998	-0.7622	
GOVCONS	-3.0730***		I(0)	-3.0924***		I(0)
	-0.0011			-0.001		
OPENNESS	-1.2404	-10.4536	I(1)	-1.8357**		I(0)
	-0.1074	0.000		-0.0332		
POLITY	0.5594	-8.3915	I(1)	0.9919	-11.0103	I(1)
	-0.7121	0.000		-0.8394	0.000	

*** p<0.01, ** p<0.05, * p<0.1

RPCGDP=Real per capita GDP in constant 2005 US dollars, PCR = private credit by deposit money banks to GDP(%), Govcons= government final consumption expenditure to GDP(%), Openness=trade openness (ratio of exports + imports to GDP), Polity=measure of democracy ranging from -10 (least democratic) to 10 (most democratic), Mktcap=Stock market capitalisation to GDP(%), Vtraded= Stock market value traded to GDP(%)

2.5 Estimation results

Four sets of results using the PMG, MG and DFE estimation procedures are discussed in this section. Tables 2-4 and 2-5 depict the results including the full sample, first excluding and then including the indicator of financial development. On the basis that South Africa and Mauritius appear as outliers, results excluding these two countries are presented in tables 2-6 and 2-7, first excluding and then including an indicator of financial development.

Our sample of countries with stock markets is small and the time period of available data fairly narrow.(Pesaran, Shin and Smith, 1999) show that the choice of the lag order is very important in estimations with small T. This section thus covers our attempt to establish the optimal lag length using

the AIC and BIC selection criteria. Table 2-3 shows that a maximum lag of 1 has the smallest AIC and BIC values, implying that an ARDL (1,1,1,1,1,1) is the preferred model.

Table 2-3: Lag selection criteria

		Including South Africa and Mauritius			Excluding South Africa and Mauritius		
Estimator	Lag selection	N	AIC	BIC	N	AIC	BIC
PMG	ARDL (1,1,1,1,1,1)	307	-1621.8	-1569.63	250	-1304.3	-1254.998
	ARDL (2,2,2,2,2,2)	307	-1371.63	-1326.95	238	-1105.55	-1056.937
MG	ARDL (1,1,1,1,1,1)	307	-1892.71	-1847.99	250	-1610.2	-1571.466
	ARDL (2,2,2,2,2,2)	307	-1610.2	-1565.52	238	-1254.6	-1216.405

Columns (1), (2) and (3) of table 2-4 present the first set of results. To correct for heteroscedasticity, the DFE results in column (3) have been adjusted with robust standard errors. The MG and DFE results (columns 2 and 3) indicate that the error correction term is negative and significant at the 1 percent significance level. This confirms that there is cointegration. The PMG results (column 1) are, however, inconsistent with the MG and the DFE results, with the results indicating an insignificant error correction term. The Hausman specification aids in selecting the preferred model, and the results shown at the bottom of the table reject the null hypothesis of simultaneity bias of the DFE that could arise due to the relationship between the error term and the lagged dependent variable. This implies that the DFE results are preferred to the MG results.

The results show that financial structure has no significant effect on growth, implying that financial structure does not matter for long-run growth. These results are consistent with existing literature (see Levine 2002; Beck & Levine 2002) which suggests that there is no economic significance of classifying a country's financial system as either bank-based or market-based. The control variables (of column 3) have the expected signs and significance. For example, inflation has a negative and significant effect on growth and a 10 percent increase in inflation leads to a 0.03 percent decline in growth. This is significant at 1 percent. An improvement in life expectancy, which is a proxy for human capital, has a positive effect on growth at 1 percent significance level, and likewise, an improvement in political governance will lead to a positive effect on growth. This is similar to findings by Kodongo & Ojah (2016), who show that democracy and rule of law have a positive and significant effect on growth, moreso in SSA. Government expenditure has a negative and significant effect on growth and a 10 percent increase in government expenditure leads to a 6 percent decline in growth.

Table 2-4: Financial structure and economic growth for the full sample excluding financial development

VARIABLES	PMG (1)	MG (2)	DFE (3)
FSINDEX	0.008	0.0353	-0.0825
	(0.0103)	(0.0259)	(0.0719)
Inflation	0.0000158	0,00861	-0.00034***
	(0.0000)	(0.0083)	(0.0001)
Life expectancy	1.636***	2.503**	2.525***
	(0.1600)	(1.1560)	(0.8370)
Govcons	0.301***	0.936	-0.599*
	(0.0799)	(0.8400)	(0.3240)
Openness	0.458***	0.0156	0.481
	(0.0999)	(0.5860)	(0.3820)
Polity	0.00973*	0.00847	0.0976***
	(0.0051)	(0.0074)	(0.0350)
ECT	-0.0573	-0.550***	-0.0374***
	(0.0371)	(0.1040)	(0.0123)
Constant	-0.161	-1.175	-0.108
	(0.1000)	(1.3980)	(0.1250)
Hausman	3.61	0.02	
Prob>chi2	0.7295	1.0000	
Observations	307	307	

*Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1*

RPCGDP=Real per capita GDP in constant 2005 US dollars, FSIndex =conglomerate measure of financial structure comprising of FS_activity and FS_Size, Govcons= government final consumption expenditure to GDP(%), Openness=trade openness (ratio of exports + imports to GDP), Polity = political governance

Columns (1), (2) and (3) of table 2-5 depict results, including an indicator of financial development. The ratio of credit to the private sector by deposit money banks to GDP has been used in the literature to measure financial development (see King & Levine 1993; Levine 2002). However, we suspect that there could be a high correlation between the financial structure indicator and the measure of financial development. However, the correlation coefficient results (appendix A.3) show that this is not the case, and the ratio of credit to the private sector by deposit money banks to GDP (PCR) is thus used. Furthermore, PCR represents the productive aspect of finance that is used for investment purposes and is therefore more closely linked to economic growth than other variables that have been used in the literature to measure financial development. These include the ratio of liquid liabilities to GDP, the ratio of broad money to GDP (M3/GDP), and the ratio of deposit money bank assets to GDP (see, for example, Allen & Ndikumana 2000).

The PMG, MG and DFE results are depicted in columns (1), (2) and (3) respectively of table 2-5. Like in the previous estimation, the DFE results are corrected for heteroscedasticity with robust standard errors. The PMG and DFE results depict an insignificant effect of financial structure on growth,

consistent with the results shown in table 2-4. Column (2) however depicts a significant a significant effect of financial structure on growth. The Hausman specification test aids in establishing the most preferred model based on efficiency and consistency of the estimates.

Table 2-5: Results on financial structure and economic growth for the full sample including financial development

VARIABLES	PMG	MG	DFE
	(1)	(2)	(3)
FSindex	-0.00612	0.0405***	-0.0521
	(0.0065)	(0.0149)	(0.0783)
PCR	-0.139***	-0.0363	0.082
	(0.0222)	(0.1830)	(0.2200)
Inflation	-0.0000219	-0.00452	-0.000351**
	(0.0000)	(0.0028)	(0.0001)
Life expectancy	2.328***	0.567	2.565**
	(0.0987)	(0.8540)	(1.1710)
Govcons	0.132***	0.0111	-0.604*
	(0.0185)	(0.2230)	(0.3600)
Openness	0.0687**	-0.0116	0.47
	(0.0277)	(0.0912)	(0.4630)
Polity	0.0251***	0.0167*	0.0879**
	(0.0073)	(0.0089)	(0.0408)
ECT	-0.160*	-0.601***	-0.0356**
	(0.0943)	(0.1560)	(0.0144)
Constant	-0.532	0.459	-0.118
	(0.3350)	(1.7960)	(0.1490)
Hausman	7.65	0.00	
Prob>chi2	0.3647	1.0000	
Observations	307	307	307

*Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

RPCGDP=Real per capita GDP in constant 2005 US dollars, FSIndex =conglomerate measure of financial structure comprising of FS_activity and FS_Size, Govcons= government final consumption expenditure to GDP(%), Openness=trade openness (ratio of exports + imports to GDP), Polity = political governance

As shown in the table, the Hausman test indicates that the PMG results are more efficient than the MG results, and the null hypothesis of no difference between PMG and MG cannot be rejected. Likewise, the Hausman test between the MG and the DFE indicates that the DFE is preferred to MG.

Despite the consistent results showing insignificant effects of financial structure on growth, the results also show that financial development has a negative and significant effect on growth (column 1). This is inconsistent with existing views, which postulate that the provision of financial services is what matters for economic growth, and not whether these services are provided by banks or stock markets. The expectation from literature, therefore, would be a positive and significant effect of financial development on growth, and an insignificant effect of financial structure. This expectation supports the financial

services view. We argue that, while the results on column 1 of table 2-5 are contrary to expectations, it has been shown that a restrictive financial infrastructure can be a barrier to development (Kenny and Moss, 1998). Given the low levels of financial development in SSA, it is therefore not surprising to see a negative effect of financial development on growth. A well functioning financial sector is a necessary condition for positive gains to be felt on the economy. Furthermore, emerging evidence points to limited support for the relationship between financial sector development and growth in Africa (Gries, Kraft and Meierrieks, 2009; Menyah, Nazlioglu and Wolde-Rufael, 2014). Moreover, Favarra (2009) concludes that the relationship between financial development and growth is at best weak, and that finance matters for growth at the intermediate level, where financial sectors are relatively well development.

The results also indicate that an improvement in life expectancy and political governance has a positive and significant effect on growth (columns 1 and 3). Inflation on both columns has the expected negative sign, but it is insignificant from the PMG results. Likewise, trade openness has the expected positive sign from the PMG and DFE estimations, implying that it has a positive effect on growth. However, DFE results (column 3) depict an insignificant effect.

The error correction term is negative and significant in all the estimations, albeit with different speeds of adjustment. The negative and significant coefficient implies that there is cointegration with the PMG results, showing that 16 percent of the disequilibrium is eliminated in each short-term period. The DFE results in column 3, however, depict a slower rate of convergence to long-run equilibrium at 3 percent.

Excluding South Africa and Mauritius yields results consistent results with those shown in tables 2-4 and 2-5. These results are depicted in columns (1), (2) and (3) of table 2-6. Financial structure still shows an insignificant effect on growth from all three estimations (PMG, MG and DFE). The Hausman specification test shows that PMG is preferred over MG and that DFE is preferred over MG. The DFE results have been corrected for heteroscedasticity with robust standard errors. In all the estimations, the error correction term is negative and significant, implying that there is cointegration. Comparing the DFE results in tables 2-4 and 2-6 (column 3 in both tables), reveals that the results in table 2-6 depict slightly smaller magnitudes, with a faster speed of adjustment to the long-run equilibrium. While results in table 2-4 indicate a 4 percent adjustment speed, results in table 2-6 indicate a 5 percent adjustment speed.

Table 2-6: Financial structure and economic growth excluding South Africa and Mauritius

VARIABLES	PMG	MG	DFE
	(1)	(2)	(3)
FSindex	0.0132	0.0192	-0.0821
	(0.0111)	(0.0276)	(0.0555)
Inflation	1.57E-05	0.0115	-0.000236***
	(0.0000)	(0.0090)	(0.0001)
Life expectancy	1.519***	1.837*	2.492***
	(0.1630)	(1.0600)	(0.6850)
Govcons	0.307***	1.118	-0.418*
	(0.0840)	(0.9910)	(0.2320)
Openness	0.468***	-0.127	0.204
	(0.1020)	(0.6350)	(0.2900)
Polity	0.0113**	0.0107	0.0680***
	(0.0052)	(0.0083)	(0.0229)
ECT	-0.0754*	-0.567***	-0.0518***
	(0.0403)	(0.1180)	(0.0151)
Constant	-0.170*	-1.145	-0.118
	(0.0966)	(1.4260)	(0.1370)
Hausman	4.37	0.02	
Prob>chi2	0.6261	1.000	
Observations	250	250	250

*Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1*

RPCGDP=Real per capita GDP in constant 2005 US dollars, FSIndex =conglomerate measure of financial structure comprising of FS_activity and FS_Size, Govcons= government final consumption expenditure to GDP(%), Openness=trade openness (ratio of exports + imports to GDP), Polity = political governance

The signs and significance of the control variables are consistent with those obtained when we include South Africa and Mauritius. For example, an improvement in life expectancy and political governance has a positive and significant effect on growth. Including South Africa and Mauritius therefore does not alter the DFE results. However, the PMG results (column 1) depict a negative and significant error correction term, which is inconsistent with the results in table 2-4 that exclude South Africa and Mauritius. Nevertheless, the insignificant effect of financial structure on growth is consistent with previous estimations.

The final set of long-run results are presented in table 2-7, which exclude South Africa and Mauritius, but include financial development. As in previous results, financial structure has an insignificant effect on growth, as shown in columns (1) and (3) of table 2-7. Even though the results in column (2) show a significant effect of financial structure on growth, the Hausman results indicate that the PMG results (column 1) are preferred to the MG results (column 2), and that the DFE results (column 3) are preferred to the MG results. Comparing table 2-7 and table 2-5, the results indicate a faster adjustment speed to the long-run when South Africa and Mauritius are excluded, and financial development is included. The effect of financial development is found to be insignificant in the long-run. The results are inconsistent

with the financial services view that predicts a positive and significant effect of financial development on growth and an insignificant effect of financial structure on growth.

The short-run results show that financial structure is consistently insignificant in 10[14] of the 14 countries (appendix A.5 – A.7). In Zimbabwe, financial structure has a significant effect on growth, implying that financial structure matters in the short-run, as depicted in all the tables. The positive coefficient implies that the stock market is more conducive to growth in Zimbabwe than the banking sector. This is different for Malawi, where financial structure also has a significant effect on growth in the short-run, but the banking sector is found to be more conducive for growth than the stock market. It can be argued that the stock market in Malawi is young (established in 1996) compared to that of Zimbabwe (established in 1946). Activity in the stock market in Malawi is also very low (at less than 1 percent) with stock market capitalisation of less than 10 percent (see figures 2-3a and 2-3b). Financial structure is also found to be significant in Swaziland, but this is only after including financial development in the estimation (appendix A.5 and A.7). In both tables, the positive sign implies that the stock market is more conducive to growth than the banking sector.

Overall, the long-run results do not support the theories of financial structure. Specifically, the results do not support the bank-based view, the market-based view, or the financial services view. (See table 2-8 for a summary of the long-run results). Financial structure does not matter for economic growth in the long-run, and this is consistent across all the estimations. Similar conclusions are found in Levine (2002) and Beck & Levine (2002).

[14] Botswana, Cote d'Ivoire, Ghana, Kenya, Mauritius, Namibia, South Africa, Tanzania, Uganda, and Zambia

Table 2-7: Financial structure and economic growth excluding South Africa and Mauritius and including financial development

VARIABLES	PMG (1)	MG (2)	DFE (3)
FSindex	6.69E-05	0.0371**	-0.0777
	(0.0026)	(0.0169)	(0.0588)
PCR	-0.00527	-0.0615	-0.0511
	(0.0094)	(0.2070)	(0.1530)
Inflation	-3.34e-05*	-0.00324	-0.000247**
	(0.0000)	(0.0031)	(0.0001)
Life expectancy	1.687***	0.495	2.657***
	(0.0267)	(0.9830)	(0.6600)
Govcons	-0.00801***	0.0876	-0.431**
	(0.0029)	(0.2520)	(0.2180)
Openness	0.0836***	-0.0141	0.247
	(0.0151)	(0.1050)	(0.2670)
Polity	-0.000123	0.0200*	0.0688**
	(0.0012)	(0.0105)	(0.0278)
ECT	-0.241**	-0.629***	-0.0498**
	(0.1090)	(0.1890)	(0.0225)
Constant	-0.129*	0.124	-0.146
	(00683)	(21190)	(0.1040)
Hausman	6.38	0,00	
Prob>chi2	0.4967	1,000	
Observations	250	250	250

*Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1*

RPCGDP=Real per capita GDP in constant 2005 US dollars, FSIndex =conglomerate measure of financial structure comprising of FS_activity and FS_Size, Govcons= government final consumption expenditure to GDP(%), Openness=trade openness (ratio of exports + imports to GDP), Polity = political governance

Table 2-8: Summary of the long-run results

	Including South Africa and Mauritius		Excluding South Africa and Mauritius	
Variable	PMG results		PMG results	
	Without FD	With FD	Without FD	With FD
FSINDEX	Not significant	Not significant	Not significant	Not significant
FD	na	-	na	Not significant
Inflation	Not significant	Not significant	Not significant	-
Life expectancy	+	+	+	+
Govcons	+	+	+	-
Openness	+	+	+	+
Polity	+	+	+	Not significant
ECT	Not significant	-	-	-

Robustness check

Our results are robust to various sensitivity checks that include estimating the equations using the different components of financial structure (appendix A.4), sample grouping and exclusion/inclusion of financial development. From the summary on table 2-8, our results show that financial structure is consistently insignificant in all the four estimations, leading us to conclude that financial structure does not matter for the sample countries in our study. The PMG estimates in appendix A.4 also show that financial structure does not matter. These results were obtained from the individual components of financial structure (FS_activity and FS_size). Even though the FS_activity appears significant, the error correction term is not significant, and therefore we conclude that there is no long-run relationship. The results also show that FS_size has an insignificant effect, in line with the results obtained using the FSindex.

2.6 Conclusion

The effect of financial structure on growth has been widely researched, with inconclusive results. There has, however, been very little research on the effect of financial structure on growth in SSA, mainly because of the scarcity of data. Moreover, many stock markets in SSA are young compared to stock markets in developed countries. Using data from the recently updated GFDD, an extensive dataset of financial system characteristics for economies across the globe, this study tries to fill this gap in the literature by providing empirical evidence from SSA.

The study was carried out using data from 14 countries covering 1980 – 2014. Using dynamic panel estimation methods, financial structure was found to have an insignificant effect on growth in the long-run. This supports existing literature that shows that financial structure does not matter for growth, implying that there is no economic significance in classifying a country's financial system as either bank-based or market-based. The growth control variables used in the study were also found to have the expected sign and significance. For example, an increase in life expectancy and improvement in political governance were found to have a positive effect on growth, while high inflation was found to have a negative and significant effect on growth.

Including financial development, or excluding Mauritius and South Africa as outliers in the model did not alter the results. The results that financial structure does not matter were consistent across all the long-run estimations. As has been noted in the literature, stock markets in SSA are mainly a replication

of stock markets in the west, and therefore their establishment was not to meet the financial needs of the region. This could explain why financial structure does not matter in the long-run in the SSA region.

Financial structure was also found to be consistently insignificant in the short-run for 10 of the 14 countries (Botswana, Cote d'Ivoire, Ghana, Kenya, Mauritius, Namibia, South Africa, Tanzania, Uganda, and Zambia). Furthermore, while a market-based system was found to be more conducive to growth in Zimbabwe, a bank-based system was found to be more beneficial for growth in Malawi. This finding from the short-run estimates implies that forcing equality of parameters by assuming homogeneity (as was done for the long-run results) may lead to misleading generalisations about the effect of financial structure on growth based on regional studies.

The heterogeneous results found in the short-run provide evidence that results can vary considerably across countries depending on the institutional characteristics of the countries, as well as other country circumstances. The literature on cross country growth regressions reveals some scepticism around the robustness of econometric results derived from cross country regressions, and points out that there are econometric advantages in examining results from time-series analyses, as they provide useful insights from details that are hidden in averaged out cross country regressions. (see Levine & Renelt 1992; Arestis et al. 2001; Jones 1995 among others). This is the motivation for our research covered in chapter three, which provides evidence from Kenya.

These results have important policy implications. While finance is important for economic growth, it is important for governments in SSA to focus on developing the banking sector to a level where it is able to support the financial needs of the economy, especially for small and micro enterprises, which are the engine for growth in the region. These enterprises have been shown not to participate in stock markets, because they do not meet the listing requirements. They therefore do not benefit from the existence of a stock market. However, the London Stock Exchange Alternative Investment Market (AIM) has in the past offered a platform for the listing of smaller growing firms from SSA looking to raise capital through Initial Public Offers (IPOs) (Tyson, 2015). The Exchange has also established partnerships with regional exchanges in SSA to provide technical support for capital market development in the region. Most recently, stock markets in SSA have begun establishing market segments that cater for SMEs. For example, Kenya, Zambia and Ghana opened up market segments for listing of SMEs in 2013, 2015 and 2013 respectively.

For example, the Johannesburg Stock Exchange in South Africa set up the AltX market for SMEs in 2003, the Mauritius Stock Exchange set up a development and enterprise market for SMEs in 2006, Kenya, and Ghana[15] opened up market segments for the listing of SMEs in 2013, and Zambia did the same in 2015.

In countries with underdeveloped banking sectors, the priority should be to develop the banking sector first, and later on develop the stock market, with a focus on the alternative investment market segments targeted for SMEs. It is important to remove the bottlenecks that have hindered the banking sector from contributing to growth.

A limitation of this study is the lack of a large enough sample size, due to data limitations. This restricted the analysis to 14 countries in a region that consists of 48 countries. As more data becomes available from countries with existing stock markets, and as countries expand access to finance, further research will be needed on the economic benefits of bank-based vs market-based financial systems in SSA.

The study did not incorporate information from the recently established alternative investment market segments in some stock markets in the region, established to cater for SMEs in the region, again due to data limitations.

[15] The Growth and Enterprise Market (GEM) in Kenya, Lusaka Stock Exchange Alternative Market in Zambia and Ghana Alternative Market (GAM) in Ghana

Appendix A

A.1 Variable definition and data sources

Variable abbreviation	Description	Source
RPCGDP	Real per capita GDP (constant 2005 USD)	WDI, 2016
PCR	Private credit by deposit money banks to GDP (%)	GFDD, 2016
Mktcap	Stock market capitalisation to GDP (%)	"
Vtraded	Stock market total value traded to GDP (%)	"
Inflation	Inflation, Consumer price (annual %)	WDI, 2016
Life Expectancy	Life expectancy at birth (years)	"
Govcons	General government final consumption expenditure (% GDP)	"
Openness	Trade (% GDP)	"
Polity	A measure of the system of a country's system of governance. It ranges from -10 (total autocracy) to 10 (total democracy)	Polity IV

WDI =World Development Indicators and GFDD = Global Financial Development Database

A.2 Sample means of main variables

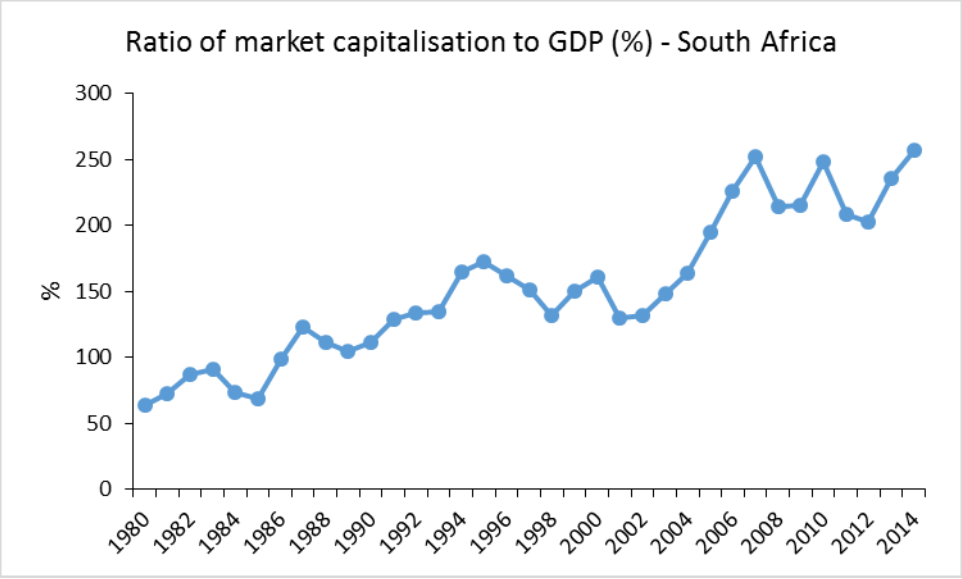
Country	Period	RPCGDP	PCR	Mktcap	Vtraded
Botswana	1990 - 2014	5,120.04	17.53	20.56	0.8
Cote d'Ivore	1989 - 2014	1,008.72	19.37	14.68	0.39
Ghana	1992 - 2014	513.78	10.34	9.76	0.39
Kenya	1989 - 2014	546.28	24.66	20.71	1.23
Malawi	1999 - 2014	235.93	7.11	16.38	0.52
Mauritius	1991 - 2014	4,929.19	62.8	42.86	2.25
Namibia	1994 - 2014	3,552.10	44.53	5.07	0.28
Nigeria	1989 - 2014	722.13	13.6	15.92	1.49
South Africa	1980 - 2014	5,302.59	58.68	152.11	28.53
Swaziland	1994 - 2014	2,302.29	16.9	9.57	2.64
Tanzania	1998 - 2014	456.94	10.05	4.1	0.11
Uganda	1999 - 2014	353.56	10.09	10.95	0.09
Zambia	1995 - 2014	731.7	8.46	12.84	0.14
Zimbabwe	1988 - 2014	557.28	16.83	76.34	8.9

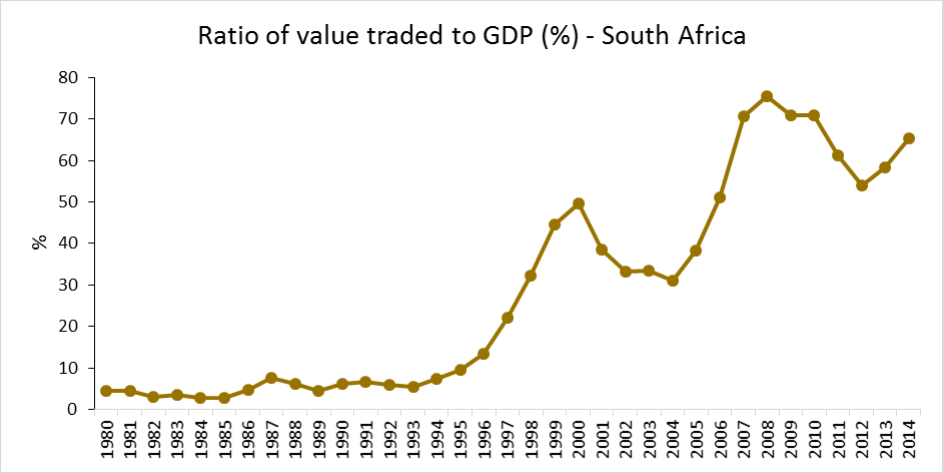
A.3 Correlation coefficients

	RPCGDP	Fsindex	PCR	Mktcap	Vtraded	Inflation	Life expectancy	Govcons	Openness	Polity
RPCGDP	1									
Fsindex	0.01	1								
PCR	0.7517*	0.02	1							
Mktcap	0.3213*	0.8274*	0.4615*	1						
Vtraded	0.3811*	0.7529*	0.5297*	0.7705*	1					
Inflation	-0.06	0.1138*	0	0.08	0.09	1				
Life expectancy	0.4629*	-0.1394*	0.5414*	0.1513*	0.2031*	-0.1	1			
Govcons	0.4628*	-0.09	0.3419*	0.02	0.1704*	-0.2336*	0.2363*	1		
Openness	0.4426*	-0.08	0.2652*	0.02	0.02	0.02	0.1902*	0.1739*	1	
Polity	0.4071*	0.1747*	0.3838*	0.3087*	0.4256*	-0.0682	0.5324*	0.1404*	0.0507	1

* denotes p<0.05

A.4 Ratio of stock market capitalization and Value traded to GDP for South Africa





A.5 Long-run Estimation results using different components of FS_activity and FS_size

Estimation results using FS_Activity				Estimation results using FS_SIZE			
VARIABLES	PMG	MG	DFE		PMG	MG	DFE
	(1)	(2)	(3)		(4)	(5)	(6)
FS_Activity	0.107***	0.053	-0.011	FS_Size	0.000353	0.0322*	-0.0956
	(0.0328)	(0.0592)	(0.0704)		(0.0021)	(0.0192)	(0.0711)
Inflation	-0.00741***	0.0047	-0.000372**	Inflation	-1.90E-05	0.00764	-0.000363***
	(0.0024)	(0.0054)	(0.0002)		(0.0000)	(0.0273)	(0.0001)
Expectancy	0.851***	2.723**	2.632***	Expectancy	1.672***	2.175	2.399***
	(0.1690)	(1.2650)	(0.8050)		(0.0140)	(4.0470)	(0.8420)
Govcons	0.404***	0.798	-0.637*	Govcons	-0.00860***	-3.411	-0.634*
	(0.1230)	(0.6790)	(0.3720)		(0.0025)	(2.4730)	(0.3430)
Openness	0.368***	-0.0436	0.426	Openness	0.0889***	-1.305	0.512
	(0.1290)	(0.4030)	(0.3580)		(0.0106)	(2.2230)	(0.3970)
Polity	0.00818	0.0316	0.0930**	Polity	4.45E-05	-0.0148	0.0969***
	(0.0062)	(0.0267)	(0.0389)		(0.0011)	(0.0202)	(0.0355)
ECT	-0.0377	-0.455***	-0.0362**	ECT	-0.189**	-0.523***	-0.0360***
	(0.0275)	(0.1190)	(0.0163)		(0.0955)	(0.1020)	(0.0122)
Constant	0.0408	-0.264	-0.12	Constant	-0.114**	-1.178	-0.0982
	(0.0371)	(1.3890)	(0.1610)		(0.0566)	(1.3750)	(0.1250)
Hausman		12.64	0.00	Hausman		10.44	0.03
Prob>chi2		0.0492	1.000	Prob>chi2		0.1074	1.000
Observations	311	311	311	Observations	311	311	311

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

A.6 Individual country short-run estimation results controlling for the level of financial development

Variables	Botswana	Cote d'ivore	Ghana	Kenya	Malawi	Mauritius	Namibia	Nigeria	South Africa	Swaziland	Tanzania	Uganda	Zambia	Zimbabwe
ECT	-0.025	-0.256***	0.0751**	-0.0278	-0.113***	-0.00899	0.0703	-0.133**	0.0578***	-0.0438***	-1.325***	-0.289***	-0.105**	-0.116***
	(0.0195)	(0.0589)	(0.0349)	(0.0392)	(0.0304)	(0.0115)	(0.0688)	(0.0581)	(0.0202)	(0.0111)	(0.2100)	(0.0628)	(0.0471)	(0.0263)
D.FSindex	0.0613***	0.0243	-0.0019	-0.00316	-0.0259**	0.00832	0.0048	0.0355*	0.00597	0.00435***	0.00986*	-0.00396	-0.00883	0.0358**
	(0.0231)	(0.0153)	(0.0060)	(0.0116)	(0.0130)	(0.0149)	(0.0095)	(0.0215)	(0.0194)	(0.0017)	(0.0059)	(0.0033)	(0.0129)	(0.0143)
D.PCR	0.0817*	0.048	-0.0727**	-0.0661	-0.0627	-0.0281	-0.0111	-0.0202	-0.0164	0.0806***	0.0705***	0.0838**	0.0116	-0.0311
	(0.0443)	(0.0843)	(0.0302)	(0.0534)	(0.0397)	(0.0640)	(0.1120)	(0.0365)	(0.0643)	(0.0126)	(0.0265)	(0.0355)	(0.0304)	(0.0358)
D.Inflation	0.00792***	-0.00214**	-0.000324	-0.000873**	-0.00435***	-0.000195	-0.00134	-0.000632	-0.00228	0.000344	0.000884	0.000576	-0.000688	5.17e-06**
	(0.0015)	(0.0008)	(0.0003)	(0.0003)	(0.0010)	(0.0013)	(0.0051)	(0.0005)	(0.0016)	(0.0003)	(0.0006)	(0.0004)	(0.0006)	(0.0000)
D.Expectancy	-0.0504	-3.597***	-0.412	0.671*	2.907***	1.216	0.49	6.683***	-0.391	0.187	-0.359	-2.239*	0.623	-0.852**
	(0.1810)	(1.1230)	(1.1320)	(0.4040)	(0.8600)	(1.3000)	(0.4630)	(2.0580)	(0.2630)	(0.1420)	(1.2970)	(1.2220)	(0.5570)	(0.4030)
D.Gov	-0.234***	-0.0335	0.0914***	-0.0299	0.0539*	-0.171**	0.00676	0.0157	-0.0385	-0.0543***	-0.0889***	-0.024	-0.0224**	0.0258
	(0.0590)	(0.0475)	(0.0236)	(0.0548)	(0.0312)	(0.0700)	(0.0872)	(0.0306)	(0.0934)	(0.0135)	(0.0243)	(0.0147)	(0.0097)	(0.0314)
D.Openness	0.416***	0.0411	-0.0077	-0.00734	0.0242	-0.0898*	-0.0936	-0.0931**	0.157***	-0.0317**	-0.0599***	0.0129	0.0397	-0.0193
	(0.0621)	(0.0840)	(0.0303)	(0.0362)	(0.0249)	(0.0507)	(0.1160)	(0.0384)	(0.0435)	(0.0129)	(0.0201)	(0.0341)	(0.0372)	(0.0732)
D.Polity	-0.0277	-0.00595**	-0.00284	-0.00339**	0.0252***	Omitted	Omitted	-0.00617	-0.00413	Omitted	omitted	-0.00986***	-0.00468**	-0.00303
	(0.0219)	(0.0029)	(0.0033)	(0.0016)	(0.0049)	0.0000	0.0000	(0.0071)	(0.0082)	0.0000	0.0000	(0.0034)	(0.0023)	(0.0117)
Constant	-0.0159	-0.608***	0.314**	-0.0816	-0.533***	0.0171	0.141	-0.368**	0.0669**	-0.0502**	-4.721***	-0.977***	-0.288**	-0.346***
	(0.0298)	(0.1580)	(0.1310)	(0.1270)	(0.1280)	(0.0215)	(0.1170)	(0.1630)	(0.0273)	(0.0209)	(0.6290)	(0.2250)	(0.1280)	(0.0821)
Observations	307	307	307	307	307	307	307	307	307	307	307	307	307	307

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

A.7 Individual country short-run estimation results estimated, excluding South Africa and Mauritius

Variables	Botswana	Cote d'ivore	Ghana	Kenya	Malawi	Namibia	Nigeria	Swaziland	Tanzania	Uganda	Zambia	Zimbabwe
ECT	-0.0395	-0.319***	0.0964***	-0.0159	-0.0804***	0.0984*	-0.0428	-0.0821***	-0.0391	-0.331***	0.0325	-0.183***
	(0.0292)	(0.0595)	(0.0372)	(0.0525)	(0.0261)	(0.0588)	(0.0385)	(0.0248)	(0.0432)	(0.0568)	(0.0312)	(0.0382)
D.FSindex	0.0362*	0.0126	-0.0031	0.00475	-0.00653	0.00531	0.0335	-0.00062	0.00208	-0.00760**	-0.00425	0.0399***
	(0.0205)	(0.0146)	(0.0061)	(0.0114)	(0.0096)	(0.0092)	(0.0229)	(0.0022)	(0.0080)	(0.0031)	(0.0115)	(0.0121)
D.Inflation	0.00813***	-0.00204**	-0.000302	-0.000808**	-0.00287***	-0.00133	-0.000725	0.000175	-0.00088	-0.000233	-0.000241	2.10E-06
	(0.0016)	(0.0008)	(0.0003)	(0.0004)	(0.0007)	(0.0048)	(0.0006)	(0.0005)	(0.0008)	(0.0004)	(0.0007)	(0.0000)
D.Expectancy	0.0846	-4.404***	-0.128	0.874***	2.396***	0.236	6.604***	0.812***	0.4	-0.532	1.805***	-1.588***
	(0.2300)	(1.0430)	(1.1760)	(0.2860)	(0.4640)	(0.4780)	(2.0550)	(0.2910)	(0.8400)	(1.1980)	(0.3970)	(0.4680)
D.Gov	-0.194***	-0.045	0.108***	-0.0213	-0.00202	0.0328	-0.00166	-0.0357*	0.0176	0.00506	-0.00273	0.0138
	(0.0561)	(0.0484)	(0.0274)	(0.0553)	(0.0232)	(0.0866)	(0.0306)	(0.0210)	(0.0269)	(0.0134)	(0.0106)	(0.0276)
D.Openness	0.361***	-0.0474	-0.0311	-0.0284	-0.00782	-0.077	-0.104**	-0.0202	0.028	-0.0634*	0.0393	-0.0729
	(0.0599)	(0.0733)	(0.0293)	(0.0365)	(0.0218)	(0.1120)	(0.0431)	(0.0192)	(0.0264)	(0.0336)	(0.0384)	(0.0664)
D.Polity	-0.0238	-0.00607**	0.000666	-0.00338**	0.0326***	Omitted	-0.00514	Omitted	Omitted	-0.00618**	-0.00554**	-0.00181
	(0.0232)	(0.0027)	(0.0035)	(0.0016)	(0.0055)	0.0000	(0.0075)	0.0000	0.0000	(0.0026)	(0.0025)	(0.0106)
Constant	-0.00934	-0.604*	0.312**	-0.0345	-0.318***	0.146	-0.0951	-0.0913	-0.0797	-0.860***	0.0686	-0.474***
	(0.0475)	(0.3160)	(0.1470)	(0.1370)	(0.0791)	(0.1130)	(0.0853)	(0.0856)	(0.1040)	(0.2870)	(0.0703)	(0.1630)
Observations	250	250	250	250	250	250	250	250	250	250	250	250

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

A.8 Individual country short-run estimation results estimated, excluding South Africa and Mauritius, and controlling for the level of financial development

Variables	Botswana	Cote d'ivore	Ghana	Kenya	Malawi	Namibia	Nigeria	Swaziland	Tanzania	Uganda	Zambia	Zimbabwe
ECT	-0.0308	-0.222***	0.0623***	0.00346	-0.147***	0.0302	-0.120**	-0.0509***	-0.262	-0.740***	-1.233***	-0.183***
	(0.0238)	(0.0755)	(0.0224)	(0.0658)	(0.0368)	(0.0948)	(0.0527)	(0.0135)	(0.2400)	(0.1210)	(0.0825)	(0.0324)
D.FSindex	0.0600**	0.0162	-0.00229	0.00132	-0.0250**	0.00346	0.0274	0.00400**	-4.70E-05	-0.00244	0.00723**	0.0326***
	(0.0233)	(0.0185)	(0.0055)	(0.0109)	(0.0125)	(0.0099)	(0.0218)	(0.0016)	(0.0079)	(0.0031)	(0.0033)	(0.0126)
D.PCR	0.0837*	-0.00401	-0.0665**	-0.06	-0.0656*	-0.0268	-0.0318	0.0740***	-0.0278	0.0269	-0.00254	-0.0507
	(0.0454)	(0.1000)	(0.0288)	(0.0536)	(0.0381)	(0.1260)	(0.0367)	(0.0125)	(0.0359)	(0.0334)	(0.0108)	(0.0323)
D.Inflation	0.00808***	-0.00209**	-0.000267	-0.000899**	-0.00448***	-0.000969	-0.000653	0.00039	-0.00071	0.000747*	-0.00109***	7.08e-06***
	(0.0015)	(0.0010)	(0.0003)	(0.0004)	(0.0010)	(0.0052)	(0.0005)	(0.0003)	(0.0008)	(0.0004)	(0.0001)	(0.0000)
D.Expectancy	-0.0744	-0.827	-0.912	0.908***	2.834***	0.676	9.212***	0.0935	1.106	-4.854***	-4.321***	-1.147***
	(0.1760)	(1.0350)	(1.0550)	(0.2190)	(0.8270)	(0.5960)	(2.2470)	(0.1280)	(0.9610)	(1.4800)	(0.4230)	(0.3700)
D.Gov	-0.233***	0.0283	0.0809***	-0.0338	0.0660**	-0.0112	0.0178	-0.0491***	0.0235	-0.00177	0.00102	0.0224
	(0.0589)	(0.0547)	(0.0224)	(0.0573)	(0.0305)	(0.0875)	(0.0304)	(0.0134)	(0.0300)	(0.0148)	(0.0031)	(0.0280)
D.Openness	0.414***	0.0115	-0.00257	-0.0118	0.0212	-0.0952	-0.0929**	-0.0318**	0.0144	0.00228	-0.0229*	-0.0403
	(0.0626)	(0.1020)	(0.0289)	(0.0367)	(0.0240)	(0.1190)	(0.0385)	(0.0131)	(0.0314)	(0.0317)	(0.0125)	(0.0657)
D.Polity	-0.0262	-0.00249	-0.00296	-0.00332**	0.0271***	Omitted	-0.00379	Omitted	Omitted	-0.00720**	-0.000479	-0.00546
	(0.0222)	(0.0034)	(0.0031)	(0.0016)	(0.0047)	0.0000	(0.0067)	0.0000	0.0000	(0.0029)	(0.0007)	(0.0105)
Constant	0.0609*	-0.00272	0.1000***	0.0112	-0.280***	-0.00536	-0.0632**	0.0503***	-0.251	-0.733***	-0.324***	-0.112***
	(0.0315)	(0.0150)	(0.0237)	(0.0513)	(0.0528)	(0.0881)	(0.0275)	(0.0120)	(0.2470)	(0.1360)	(0.0834)	(0.0236)
Observations	250	250	250	250	250	250	250	250	250	250	250	250

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Chapter 3

Financial Structure and Economic Growth: A Kenyan Case Study

3.1 Introduction

As noted in chapter two, panel and cross sectional based studies on the effect of financial structure on economic growth generally conclude that financial structure does not matter for growth. However, Levine (1996) notes that cross sectional and panel based studies mask specific features of different countries. There is therefore a need for country-specific studies to augment results from cross sectional and panel studies. Research has shown that institutional characteristics and country-specific circumstances are instrumental in driving the effects that financial institutions have on economic growth (Arestis, Demetriades and Luintel, 2001), and that a country must have the most suitable financial system, to benefit from it (Tadesse, 2002)[16]. One can therefore conclude that the effect of financial structure on economic growth is context-specific, which gives rise to the need for country specific case studies. This is further motivated by findings from a study by Luintel et al. (2008) on 14 low and middle income countries. These showed that panel estimate parameters did not correspond to country specific estimates. To the best of my knowledge this is the first similar study, focused on Kenya in a time series setting.

There are a limited number of empirical country case studies on financial structure and growth especially for developing countries, as well as a lack of consensus on the issue. This study therefore aims to contribute to the ongoing debate by focusing on Kenya, a developing country that has various features that make it an interesting case study. The contribution of this study is threefold. First, it provides empirical evidence for Kenya, a country that has not been the focus of any previous study. Second, it provides evidence on the independent role of banks on growth, the independent role of the stock market on growth and the role of financial structure on growth. Third, it makes use of an extended period of annual data as well as quarterly data that covers a more recent period.

[16] The Growth and Enterprise Market (GEM) in Kenya, Lusaka Stock Exchange Alternative Market in Zambia and Ghana Alternative Market (GAM) in Ghana

[16] While banks and capital markets are not the only institutions that make up the financial sector, they have received the most attention in studies assessing the role of financial structure and growth.

Kenya has an extensively developed financial system by the standards of developing countries in Sub Saharan Africa (Beck, 2004)[17]. Banking in its naïve form existed in Kenya long before formal banking was introduced during the colonial period, with the first bank established in 1896. Rapid expansion of the banking system occurred after independence, especially between 1966 – 1980. The penetration of mobile banking into rural areas has also helped deepen the banking system by offering an easily accessible platform for bank transactions. The Kenyan stock market, established in 1954, has also seen tremendous growth, especially after 2002, following the establishment of a democratically elected government. This stock market is one of the oldest in the region, making Kenya a good case study. Besides consideration of the characteristics of the financial system, data availability was also important in the selection of country.

Our study employs the Auto Regressive Distributed Lag (ARDL) bounds approach to co-integration by Pesaran & Shin, (1998) on Kenyan quarterly time-series data over the period 2002-2014, to establish if there exists a relationship between financial structure and economic growth, both in the short-run and the long-run. Like in previous studies, we first construct indicators of financial structure that stem from both the banking sector and the stock market[18] based on two aspects of financial structure, namely, size and activity. Three scenarios are considered, including, first, the independent role of the banking sector. Second, we investigate the independent role of the stock market. Finally, we ascertain the effect of the financial structure on economic growth.

The rest of the chapter is organized as follows: Section 3.2 highlights both the theoretical and empirical literature, while section 3.3 provides an overview of the evolution of the financial system in Kenya. The methodology is presented in section 3.4, and results and discussion follow in section 3.5. Finally, section 3.6 concludes.

[17] See also, United Nations Economic and Social Council, United Nations. Economic Commission for Africa (1966 – 04). A framework agenda for building and utilising critical capacities in Africa: A discussion draft. UN. 22nd ECA Technical preparatory committee of the conference of ministers (1996, May 6 – 8, Addis Ababa, Ethiopia), UN. ECA (31st session)

[18] We limit our investigation to banks and the stock market, because data is available on these institutions in Kenya.

3.2 Literature Review

Banks and markets engage in a number of services geared towards provision of finance to the economy. Their services include mobilisation and pooling of savings, allocation of capital, risk management and diversification, enhancing corporate governance, and easing the exchange of goods and services (Levine, 2005). The effectiveness of these services in promoting growth is dependent on the level of financial intermediation, the efficiency of this intermediation, and the composition of financial intermediation (Mwega, 2014). However, financial systems emerge and operate differently within and between countries. From the literature, there are various determinants of financial systems that explain why different structures emerge in different countries, and why structures change over time. These determinants include the political system, the legal origin of the institutions, the level of economic development, and social capital (Bhattacharyya, 2013). For example, Boot & Thakor, (1997) suggest that bank based systems provide inter-temporal risk sharing, whereas cross-sectional risk sharing is provided in market based systems. Such differences have led to arguments in favour of a well-developed banking system by some authors, while others favour a well-developed market based system. Another difference is found in the way banks and markets conduct their transactions.

Empirical analyses have been undertaken on the independent role of stock markets in promoting growth (Atje and Jovanovic, 1993; Arestis, Demetriades and Luintel, 2001), the independent role of banks (King and Levine, 1993a, 1993b; Petkovski and Kjosevski, 2014), and the combined role of both (Levine and Zervos, 1998; Beck and Levine, 2004). Using various indicators, these studies have broadened our understanding of the link between stock markets, the banking sector and economic growth, without concluding which one is more important.

As mentioned earlier, conclusions from panel based studies may lead to incorrect inferences for the different panel units[19] used (Arestis, Demetriades and Luintel, 2001). This is because panel based studies mask country specific characteristics, and also because of parameter heterogeneity across the panel units (Luintel *et al.*, 2008). These heterogeneities are brought about by the different production structures, levels of banking, financial and capital market development, thus necessitating country specific analysis.

To overcome these limitations, a number of time-series based studies have been carried out. Evidence from these studies shows that financial structure matters, not just for growth (Arestis, Luintel and Luintel, 2004; Luintel *et al.*, 2008) but it also influences the direction of causality between financial development

[19] Countries, industries, and firms

and growth (Peia and Roszbach, 2014). Analysing five developed economies[20], Arestis et al. (2001) conclude that the effect of banks on growth is more powerful than the effect of stock markets, and that the effect of stock markets may have been exaggerated by studies that utilize cross country growth regressions. They use the log of stock market capitalisation and the log of domestic bank credit as ratios of GDP to infer stock market and banking sector development indicators, respectively. They argue that countries' diverse institutional characteristics and circumstances mean that cross country growth regressions can only provide us with a general view of the relationship between finance and growth, and this can vary when considering individual countries. Furthermore, Arestis et al. (2004) conclude that financial structures exert a significant effect on the level of output in some countries, but not in others, in a sample of six developing countries. They show that market based systems have been more conducive for growth in Greece, Taiwan, South Korea and India, while bank based systems have favored growth in South Africa. In the Philippines, financial structure was insignificant in explaining growth.

Case studies with a specific focus on Africa are scarce,[21] and, like those from other regions, yield inconclusive results. Egypt, Nigeria, and South Africa are among the most widely studied African countries, because of data availability, and also because stock markets in these countries have been in existence longer than in other countries in the region. In Nigeria, evidence shows that the effect of financial structure on growth is at best weak (Rateiwa & Aziakpono, 2016) or that it does not matter for economic growth (Olofin and Afangideh, 2008). These studies, however, use different indicator variables for financial structure, and different methodologies[22]. Financial structure has been shown to be of economic significance in South Africa and Egypt, in research by (Rateiwa and Aziakpono, 2016). This study shows that this effect is positive and significant, and runs from financial structure to economic growth when FS_activity is used as a measure of financial structure in South Africa. This shows that a market-based financial system is more important in promoting growth in South Africa. In Egypt, however, the effect is negative and significant, and runs from economic growth to financial structure, implying that a bank-based system is more important for growth in that country, than a market-based system. These contradictory results call for additional evidence from other countries.

Overall, a survey of the literature shows that there is no consensus on whether financial structure matters. As mentioned earlier, this lack of consensus could be attributed to the dynamic nature of financial

[20] France, Germany, Japan, UK and USA

[21] A major reason for this is the absence of comprehensive data

[22] The study by Rateiwa & Aziakpono, 2016 is based on causality analysis using the Johansen Cointegration approach and Vector Error Correction method, while Olofin & Afangideh, 2008 use a macroeconometric method to capture relationships among the variables.

systems, as well as the lack of uniformly accepted measures of financial structure. This study adds to the literature by providing empirical evidence from Kenya, a developing country that is a particularly interesting case for analysing the financial structure and growth relationship as it is one of the most financially developed countries in SSA[23]. Its financial sector has experienced many reforms as well as financial innovations that have contributed to developing the financial system. These reforms are discussed in the overview of the Kenyan financial system in the section that follows.

3.3 Institutional context of the financial system in Kenya

This section highlights the structure of the Kenyan financial system, and developments in this system. Like other financial systems, the Kenyan financial system has undergone tremendous changes in terms of number and type of institutions, services offered, as well as supervision and regulatory frameworks, particularly from the early 1990s.

3.3.1 An overview of the financial system [24]

Banking in its native form existed in Kenya long before formal banking was introduced during the colonial period, even though there was no formal currency. The first bank was established in 1896 and two others were introduced between 1910 and 1920, along with 3 Non-Bank Financial Institutions (NBFIs), all foreign. These institutions dominated the banking sector during the time when Kenya was under the British rule. Upon independence in 1963, the government sought to loosen dominance of these banks and expand credit facilities to the local population (Ahmed & Islam, 2009).

As a result, there was a rapid expansion of the banking system between 1966 – 1980, following nationalization of institutions, and increased local participation in the banking system. There was an increase in both banks and NBFIs and, as before, banks mainly dealt with trade. Both public and private NBFIs were established to cater for sectors such as housing, agriculture, and industry, that were not thought profitable enough to be funded though commercial banking. The laws and regulations governing these banks were inherited from the British system.

Despite the rapid expansion of the sector soon after independence until the early 1980s, the sector was not instrumental in promoting development in the country as it suffered from several deficiencies. These included non-compliance with regulatory requirements, poor supervision and regulation by the central

[23] Besides Mauritius, Nigeria, and South Africa
[24] This section borrows heavily from 1) CBK (1994), and 2) UNECA (1996)

banks, partly due to lack of technical skills of the supervisory team, excessive control over deposits and lending rates, distortions through unequal incentives between banks and non-bank financial institutions, and an increase in the volume of non-performing assets (United Nations, 1996). This led to institutional failures of both banks and NBFIs in the late 1980s and early 1990s, causing the financial system to weaken and lose credibility with the public. The main cause of the weak financial system at the time was the privileged treatment that was given to NBFIs by the government, which led to a proliferation of weak NBFIs that was not matched with strengthened capacity in the Central Bank to supervise these institutions (Brownbridge, 1996). It was therefore not surprising that the period was characterized by bank failures and mergers and acquisitions, which saw the number of financial institutions decline from 74 in the 1990s to 54 by 2002, and eventually to 44 by 2014 (CBK, 2007, 2015). By 1995, under the directive of the government, and with revision of the banking Act, NBFIs were required to convert into banks or merge with their parent banks if they were owned by commercial banks.

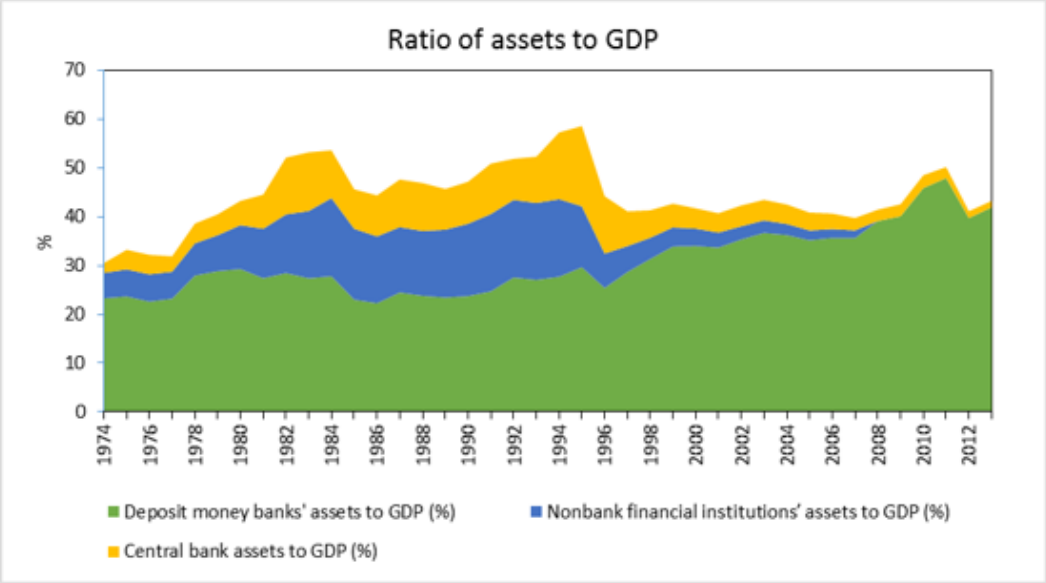
Reforms were thus inevitable to revamp and liberalise the sector to make it better placed to contribute to the country's development process. As Beck (2004) notes, Kenya had high interest rates that were a barrier to credit access by the private sector. This was partly due to a deficient legal and institutional framework characterised by fraud and insecurity, and the small size of Kenyan banks. At the same time, loan loss provisions were large, an indication of expected credit defaults. The reforms included both policy and institutional reforms, and were mainly implemented through the structural adjustment programme on economic management for renewed growth. Specifically, emphasis was on the legal, regulatory and supervisory framework for financial institutions, improvement in the efficiency of financial intermediation[25], and improvement in the institutional framework of the financial system.

Although Kenya's banking sector is still considered to be lightly regulated (Mwega, 2014), there have been tremendous improvements both in the growth of financial variables and in the legal, regulatory and supervisory framework. A look at the trend in the ratio of assets to GDP of the different types of institutions shows they have been changing over time. Figure 3-1 shows that there was a decline in the ratio of NBFI's assets to GDP from 1995. As explained earlier, this was due to the government's 1995 directive for NBFI's to convert to commercial banks or merge with their parent institutions. Commercial bank assets have also been growing faster than those of the central bank, an indication of the growing

[25] This was to be achieved by increasing competition in the financial sector.

importance of commercial banks compared to central banks. This has been used as an indicator of financial development (Beck, Demirgüç-Kunt and Levine, 2009)

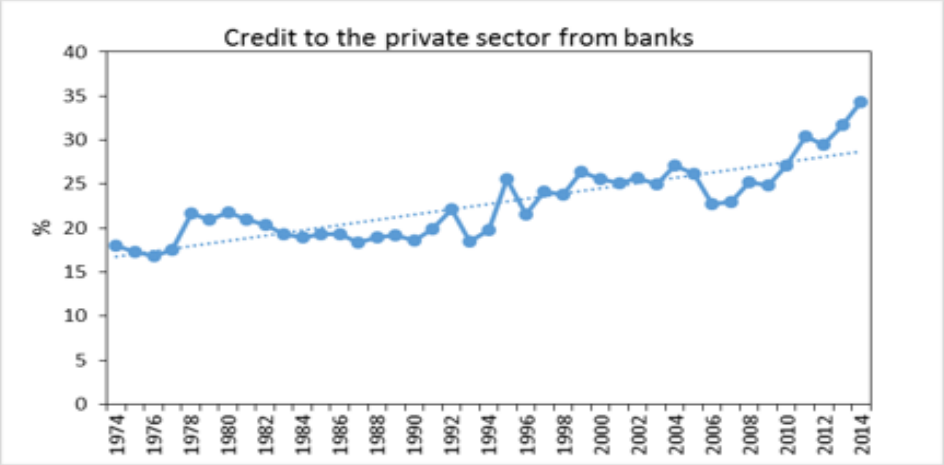
Figure 3-1: Trends in the Ratio of Assets to GDP (%)



Source: Global Financial Development Database, World Bank

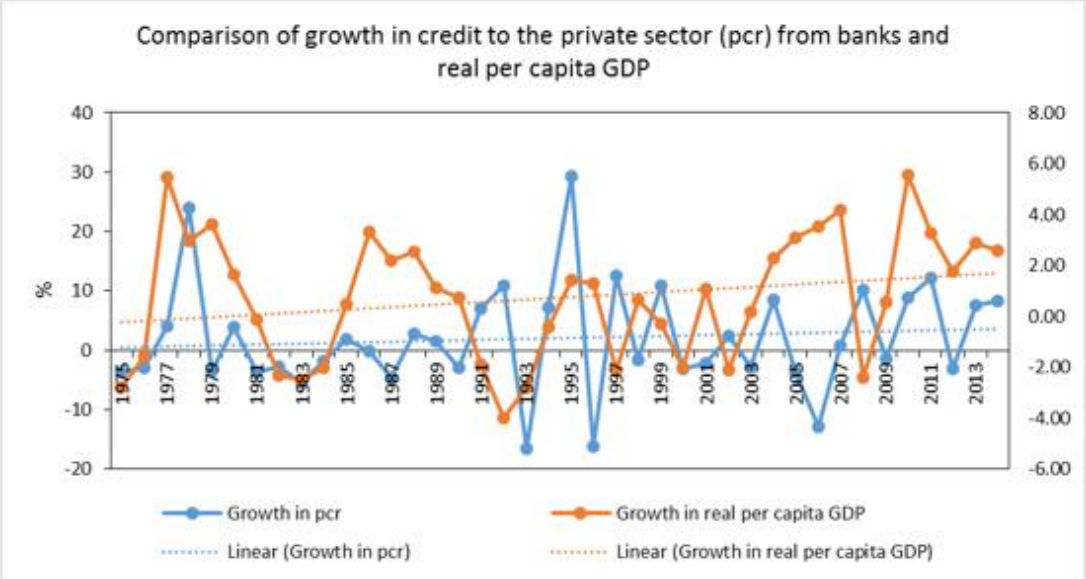
Theoretically, financial depth should be positively related to economic performance (Neal, 1990). We examine one of the indicators that has been used to characterise financial depth, credit to the private sector, which is also used as an indicator of financial development in the present study. As Figure 3-2 shows, credit to the private sector has been growing continuously, with a modest increase from just below 20% prior to 1980 to almost 35% by 2014. Comparing the growth pattern of credit to the private sector and real per capita GDP growth, we see a general pattern where the two variables seem to move together, albeit with few periods of divergence. This is shown in Figure 3-2 below.

Figure 3-2: Ratio of Credit to the Private Sector from Banks to GDP (%)



Source: World Development Indicators, World Bank

Figure 3-3: Growth in credit to the private sector from banks and real per capita GDP



Source: World Development Indicators, World Bank

The stock market has also undergone structural and institutional changes over time. Prior to 1954, there was no formal financial market in Kenya, and trading in shares was conducted in an informal setting where professionals[26] met over coffee to trade. This was during the pre-independence period dating back to 1920s. Up until 1953, local participation was a paltry 5% (Ngugi 2003). The Nairobi Stock Exchange[27] was established in 1954 to facilitate access to long term capital by private investors, and to float

[26] Lawyers, accountants, auctioneers, and real estate agents, mainly foreigners
[27] Currently the Nairobi Securities Exchange

government loans. Membership of registered[28] stockbrokers was voluntary and was governed through a committee. As most of the trading was conducted by foreigners, funds repatriation was the norm. Taxation was used to discourage the practice (Ngugi, 2003). However, this was a disincentive for new listings, and therefore in 1985/86 the capital gains tax was abolished on the grounds that it was inhibiting capital and share mobility, and therefore stifling economic growth. To strengthen the regulatory framework, the Capital Markets Authority was established in 1990 through an Act of parliament, amended in 1994. The authority was tasked with removing impediments to trading, and providing incentives for long term investments for enhanced returns from equity (UNECA, 1996).

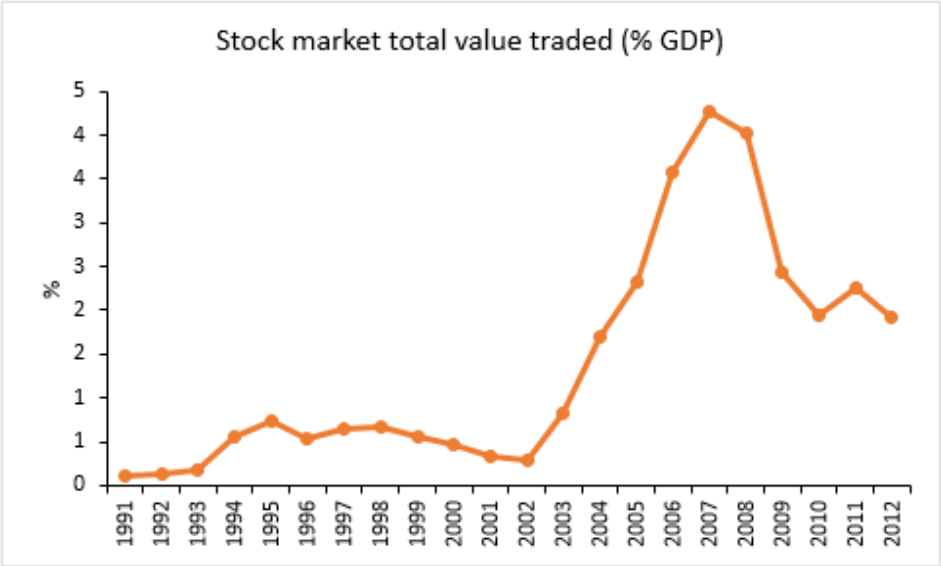
The market has undergone reforms, geared to increasing participation, enhancing efficiency, reducing transaction costs, promoting liquidity and facilitating competitiveness. The manual trading system was automated, and a Central Depository System (CDS) was established to minimise trading settlement time and improve efficiency. Currently, there are 64 listed companies, up from 48 in 2005. There has been a tremendous increase in market capitalisation since 2000, as shown in Figure 3-4. This is an indicator of the size of the capital market and it shows that there has been a tremendous increase, especially from the early 2000 even the market is still characterised as small relative, to GDP. Trading volumes are still very low relative to GDP and most of the activity occurs after 2002, as shown in Figure 3-5. Negative events that occurred after the 2007 general elections led to a sharp decline in both series. These events include the post-election violence and the global financial crisis of 2007/2008.

Figure 3-4: Stock market capitalisation (% of GDP)

Source: Global Financial Development Database, World Bank

[28] Clearance of brokers was obtained from the London Stock Exchange

Figure 3-5: Stock market value traded (% of GDP)



Source: Global Financial Development Database, World Bank

There has been remarkable growth in Kenya's financial system since the pre-colonial period. However, as in many other developing countries, the financial system has not performed as expected in promoting economic activity (Honohan and Beck, 2007). This, has been attributed to the fact that, despite having the major elements of a well-developed financial system, the country's financial system is still weak. In this regard, it fails to deliver adequate credit to the private sector for investment purposes, especially to small and micro enterprises which are the engines of growth for most developing countries (World Bank, 2005).

The above analysis has focused on variables that have been used to describe financial structure in Kenya. Two external events had a major effect on the development of stock market, but did not have a dramatic effect on the banking sector. These include the change in government in 2002 and the 2007/2008 global financial crisis. The change in government in 2002 could falsely indicate a move towards a more market-based economy, while the financial crisis could indicate a move away from a market-based economy. However, they do not reflect policies specifically geared towards promoting one financial system over another. We therefore include dummy variables to control for these two events in our analysis.

3.4 Methodology, Estimation Method and Data

3.4.1 Methodology and Estimation method

Following Levine (1997, 2002); Allen & Ndikumana (2000) among others, we employ a linear equation that relates economic growth to the financial variables and other growth control variables[29]. The baseline equation to be estimated is the following;

$$GDP_t = \alpha_0 + \alpha_1 FIN_t + \alpha_2 X_t + \varepsilon_t \quad (3\text{-}1)$$

Where GDP_t is real per capita GDP, FIN_t is the financial indicator, X_t represents the conditioning set of other growth variables including trade openness, government expenditure and the consumer price index while ε_t is the error term with the usual assumption, $\varepsilon_t \sim iid(0, \sigma^2)$.

Equation (1) is estimated within the ARDL framework which is a major workhorse in dynamic estimation of single-equation regressions (Hassler and Wolters, 2006).

The analysis proceeds by estimating the above equation using different proxies for the financial indicator variable, as used in Levine (2002); Beck et al. (2009); Tadesse (2002); Luintel et al. (2008). Specifically, we undertake the following three analyses:

1. We test the independent role of banks in economic growth, where FIN is proxied by the ratio of credit to the private sector by deposit taking financial institutions to GDP (PCR). This variable is an indicator of activity in the banking sector. For a robustness check, we also use domestic credit (DCR) as a share of GDP
2. We test the independent role of the stock market, where FIN is proxied by the value of stock traded as a ratio of GDP (MACT). This variable measures the level of activity in the market relative to economic activity. For a robustness check, we also make use of the value of market capitalisation as a ratio of GDP (MSIZE)

[29] As in Allen & Ndikumana (2000), we do not define a production function as in other standard growth models, but rather model financial structure and economic growth linearly. As in Allen & Ndikumana (2000), our results cannot be used as a basis for inferences on the parameters of the production function.

To test the influence of financial structure on economic growth, we use two proxies for FIN. First, FIN is proxied by two components of financial structure, size and activity[30] and then by a financial structure index[31.] A statistically significant coefficient on FIN in this analysis signifies that financial structure matters for growth. Specifically, a positive and significant coefficient implies that a market-based system is more important for growth than a bank-based system, while a negative and significant sign implies that a bank-based system is more important for growth than a market-based system (Levine, 2002; Luintel *et al.*, 2008) .

Establishing the determinants of growth is an open ended research agenda, and, as Levine & Renelt (1992) note, there is no consensus on a conditioning set of explanatory variables in growth regressions. Many growth-related empirical studies stress that, besides capital and labour listed in the Solow model (Solow, 1956), there are other factors that affect growth in a country. Levine & Renelt (1992) identify over 50 explanatory variables used in the literature, although most studies adopt only a small subset of these.

We also select a subset of explanatory variables to form our conditioning set. As noted in the previous chapter, explanatory variables include fiscal policy variables e.g. government expenditure, investment (when growth rate in real per capita GDP is the dependent variable); trade policy indicators, e.g. exports, imports and exchange rate, monetary and political indicators, e.g. inflation, coups and revolutions, black market premium, among others. In Kenya, it was found that trade openness was the key determinant for the improvement in total factor productivity (Kumar, Pacheco and others, 2010). Guided by the literature and availability of quarterly data, we include inflation (INF), government expenditure (GOV) and trade openness (TRADE) as our conditioning set of variables.[32]

[30] (i) FS_Activity is the log of the ratio of stock market value traded/GDP to private sector credit from banks/GDP, (ii) FS_size is the log of the ratio of stock market capitalisation/GDP to private sector credit from banks/GDP

[31]In this study, we adopt the method used by Allen & Ndikumana (2000) to create a financial development measure, but in our case, the objective is to create a financial structure index. We use the aforementioned indicators from the banking sector and the stock market to generate the index defined as;

$$FSindex_t = \frac{1}{m}\sum_{i=1}^{m}\left\{100 * \frac{FS_t}{\bar{FS}}\right\} \quad (3)$$

FS_t is the financial structure indicator, $\bar{FS}$ the sample mean of FS_t and m is the number of indicators used, in our case two, structure_activity and structure_size

[32] For annual data, we include gross fixed capital formation (GFCF) in the conditioning set.

Rewriting equation (3-1) and inserting our control variables gives us equation (2) below:

$$GDP_t = \alpha_0 + \alpha_1 FIN_t + \alpha_2 TRADE_t + \alpha_3 GOV_t + \alpha_4 CPI_t + \varepsilon_t \quad (3\text{-}2)$$

The above equation is estimated using the Auto Regressive Distributed Lag (ARDL) model approach to cointegration developed by Pesaran et al. (2001) and Pesaran & Shin (1998) that allows us to depict both short-run and long-run dynamics in a single equation. This approach is applicable for stationary and non-stationary variables. However, where they are not stationary, variables need not be integrated of a higher order than one. This means that this method can be used whether the variables are I(0), I(1) or mutually cointegrated. The procedure is thus based on two polar cases. That is, this method is appropriate where, on the one hand, we assume that all variables are purely I(0), and on the other hand, we assume the variables are purely I(1), to come up with critical value bounds. Based on the Wald or F-statistic, if the statistic falls outside the critical bounds, one can draw conclusions on whether the variables are cointegrated. If the statistic falls outside the lower critical bounds, the variables are not cointegrated, and if it falls above the upper critical bounds, the variables are cointegrated. The region in between the lower and upper bounds is one of inconclusiveness.

One major problem that we may be confronted with is the endogeneity of the explanatory variables in our model. As has been shown in many empirical studies on finance and growth, the financial sector could arise as a response to the demands of the economic sector, so that it is not obvious that finance leads to growth. In such a case, our explanatory variables may not be strictly exogenous. However, as Pesaran (1997) notes, "*...the ARDL approach is applicable even if the explanatory variables are endogenous, irrespective of whether they are I(1) or I(0)"* (pg 183). This makes it applicable in our estimation.

The optimal lag length is selected using the Akaike Criterion. Rewriting equation (2) and assuming an ARDL (1,1,1,1,1) gives us;

$$\begin{aligned} GDP_t = \alpha_0 + \delta_{10} FIN_t + \delta_{11} FIN_{t-1} + \delta_{20} TRADE_t + \delta_{21} TRADE_{t-1} + \delta_{30} GOV_t \\ + \delta_{31} GOV_{t-1} + \delta_{40} CPI_t + \delta_{41} CPI_{t-1} + \varepsilon_t \end{aligned} \quad (3\text{-}3)$$

The error correction form of the above equation is written as;

$$\begin{aligned} \Delta GDP_t = \psi[GDP_{t-1} - \beta_0 - \beta_1 FIN_t - \beta_2 TRADE_t - \beta_3 GOV_t - \beta_4 CPI_t] - \delta_{11} \Delta FIN_t \\ - \delta_{21} \Delta TRADE_t - \delta_{31} \Delta GOV_t - \delta_{14} \Delta CPI_t + \upsilon_t \end{aligned} \quad (3\text{-}4)$$

Where;

$$\psi = -(1-\gamma);\ \beta_0 = \frac{\alpha_0}{1-\lambda};\ \beta_1 = \frac{\delta_{10}+\delta_{11}}{1-\lambda};\ \beta_2 = \frac{\delta_{20}+\delta_{21}}{1-\lambda};\ \beta_3 = \frac{\delta_{30}+\delta_{31}}{1-\lambda};\ \beta_4 = \frac{\delta_{40}+\delta_{41}}{1-\lambda}$$

Structural breaks in the data: Macroeconomic data is susceptible to structural breaks, and we take this into account in our estimation. We follow Bai & Perron (2003), and endogenously determine the break points for each estimation. This is done by first estimating a break-point least squares from which we obtain the break dates[33]. These break dates are then included as time dummy variables to capture these breaks. The break years picked from the break least square estimation coincide with major events in the country. These are the years 2000 and 2002 for the annual data. While 2002 was a general election year, 2000 captures the pre-election period, with changes anticipating the likelihood of removal of power of the incumbent government which had been in power for twenty four years.

For quarterly data, the time periods captured include 2003:Q1, 2004:Q2, and 2006Q2, which coincide with the lead up to and aftermath of reform of the constitution of Kenya in 2005. The other time periods captured are 2008:Q1 and 2009:Q3, which coincide with the post-2007 election violence, and the global financial crisis.

Robustness check: To check the robustness of our estimations, we use several proxies for the financial indicator variables, as highlighted in the model specification and data section.

3.4.2 Data

We are restricted to quarterly data for our analysis of financial structure and the independent role of the stock market. This is because long-range annual time-series stock market data is not available for Kenya. However, annual bank data is available for a longer time period (1974 - 2014), and we use this data to check the robustness of the quarterly data results. The annual data is obtained from the World Development Indicators database of the World Bank, while quarterly data is obtained from the Central Bank of Kenya (CBK). For the stock market and financial structure variables, we make use of quarterly data from 2002 - 2014, obtained from the Kenya National Bureau of Statistics (KNBS), as well as from the Nairobi Securities Exchange (NSE).

[33] On relaxing the assumption that parameters do not vary across observations, it is important to establish the dates in the sample period when the parameters change. We assume that these dates are unknown *apriori* and therefore estimate them from the data. This entails running a break-point least squares regression equation in Eviews following Bai & Perron (2003)

Quarterly real per capita GDP is not readily available, and thus had to be calculated from quarterly real GDP data obtained from the quarterly economic reports of KNBS, and quarterly population numbers taken from the United Nations Population Fund (formerly United Nations Fund for Population Activities, UNFPA).

Another feature of our dataset is the combination of both flow and stock variables, which can be problematic for calculating ratios of such variables. To avoid these problems, we employ the method of Beck et al. (2000) to deflate such data (See Appendix B.1 for details).

Descriptive statistics

On average, annual credit to the private sector from commercial banks and NBFIs ranges from 17 per cent to 34 per cent, averaging 23 per cent. This is low, compared to figures for South Africa, which average 63.5 per cent. These compare favourably, however, with figures from Tanzania and Ghana at 8.6 per cent and 10 per cent respectively[34]. Domestic credit, which is an alternative measure of bank development, has an annual mean of 28 per cent. From the quarterly statistics, we see that stock market activity is very low, at 8.7 per cent, signifying little activity relative to the size of the economy. Stock market capitalisation, on the other hand, averages 27 per cent.

Table 3-1: Summary Statistics

a) Annual bank data

Variable	Mean	Max.	Min.	Std. Dev.	Obs.
RPCGDP	11.1	11.3	11	0.1	41
PCR	22.8	34.4	16.8	4.2	41
DCR	28.2	34.8	21.7	3.6	41
TRADE	58	74.6	47.7	7	41
GFCF	18.9	25.1	15.4	2.1	41
GOV	16.6	19.8	13.9	1.8	41
INF	12.9	46	1.6	8.3	41

b) Quarterly data

	Mean	Max.	Min.	Obs.
RPCGDP	9.8	9.9	9.6	52
PCR	24.0	31.2	20.6	52
MACT	8.4	28.5	0.4	52
MSIZE	26.6	41.3	7.1	52
LNTRADE	12.4	13.3	11.5	52
LNGOV	11.8	13.2	10.9	52
INF	97.5	152.5	54.5	52

[34] http://data.worldbank.org/indicator/FS.AST.PRVT.GD.ZS

The correlation coefficients shown in appendix B.3 show positive correlations between the real per capita GDP and both stock market and bank variables. However, we can only infer a positive association among the variables from these results, and therefore need to estimate if a positive linear relationship exists.

3.5 Estimation results

The unit root tests (see Appendix B.2) suggest that all variables are either I(0) or I(1). The absence of I(2) variables allows us to proceed with the ARDL approach to cointegration. The rest of this section presents the results of our examination of both the short-run and long-run relationship between the financial sector and economic growth. As explained earlier, we first take a look at how the bank and stock market variables independently predict growth, before presenting the results on the effects of financial structure on economic growth.

3.5.1 Banking sector development and economic growth

As in Demirguc-Kunt & Detragiache (1999); Levine (2002) and Rioja & Valev (2004), we use the ratio of credit to the private sector from deposit taking institutions to GDP as our measure of banking sector development. For a robustness check, we use domestic credit by banks (which includes credit to the government and the public sector). We proceed by first establishing the existence of a long-run relationship among the variables in the model, using the ARDL bounds approach to cointegration. The Akaike Information Criterion (AIC) is used for selecting the order of the lags. The bounds test confirms the existence of cointegration when we use the PCR or DCR variable (in the annual data), and when we use quarterly data. The bounds test results are shown in appendix B.4.

Table 3-2: Long-Run Estimation Results

Long-run regression results *Dependent variable: Log of real per capita GDP*		
	Annual data (1974 - 2014)	Quarterly data (2002 - 2014)
Selected model:	(2, 2, 1, 1, 3, 3)	(1, 2, 0, 2, 2)
LNPCR	0.0942	-0.2262**
	(1.514)	*(-2.3338)*
INF	-0.0014	-0.0412***
	(-1.0488)	*(-3.288)*
LNTRADE	-0.2022***	0.1358***
	(-3.2214)	*(3.65)*
LNGOV	-0.3929***	0.0824**
	(-3.2832)	*(2.00)*
LNGFCF	0.6930***	
	(7.672)	
D02	-0.0992**	
	(-2.6137)	
D00	-0.1123**	
	(-2.7755)	
D08Q1		-0.1210*
		(-1.8667)
D09Q3		-0.0959*
		(-1.9176)

*Notes: t statistics in parentheses. * signifies significant at the 0.10 level, ** significant at the 0.05 level, *** significant at the 0.01 level.*

Table 3-2 presents the long-run estimates using both annual and quarterly data. Our annual data shows no significant effect of PCR on RPCGDP, implying that there is no long-run relationship between credit to the private sector by deposit taking institution and real per capita GDP. The results did not change when we used DCR instead (see appendix B.5 and B.6). However, quarterly data shows a negative and significant relationship between PCR and RPCGDP, implying that credit to the private sector has a negative effect on real per capita GDP. A 10 percent increase in credit to the private sector leads to a 2.3 percent fall in real per capita GDP. Theoretically, it is postulated that banking sector development exerts a positive and significant effect on economic growth, with empirical studies confirming the same (King and Levine, 1993a, 1993b; Rioja and Valev, 2004b). The short-run results (see table 3-3 below), however, are consistent, whether annual or quarterly data are used.

Table 3-3: Short-run Estimation Results

Error Correction Representation of the ARDL *Dependent variable: Log of real per capita GDP*		
	Annual data: 1974 - 2014	Quarterly data 2002 - 2014
Selected model:	(2, 2, 1, 1, 3, 3)	(1, 2, 0, 2, 2)
D(LNRPCGDP(-1))	0.4409***	
	(5.885)	
D(LNPCR)	-0.09049***	-0.3971 ***
	(-4.5474)	(-6.7774)
D(LNPCR(-1))	-0.0509**	0.2571 ***
	(-2.4288)	-*(5.2)*
D(INF)	-0.0011***	-0.0014***
	(-4.9223)	-*(3.8)*
D(INF(-1))		0.0017***
		-3.841
D(LNTRADE)	0.0221	0.044***
	(1.182)	*(2.85)*
D(LNGOV)	-0.0706*	-0.006
	(-2.5825)	*(-1.2867)*
D(LNGOV(-1))	0.0256	-0.0252***
	(0.924)	*(-4.8043)*
D(LNGOV(-2))	0.1681***	
	(6.616)	
D(LNGFCF)	0.1260***	
	(5.923)	
D(LNGFCF(-1))	-0.0440*	
	(-2.0114)	
D(LNGFCF(-2))	-0.0842**	
	(-4.2551)	
D(D02)	-0.0388***	
	(-6.0001)	
D(D00)	-0.0327***	
	(-5.1973)	
D(D08Q1)		-0.0247***
		(-3.6301)
D(D09Q3)		-0.007
		(-1.0857)
C	4.0749***	2.7999***
	(9.252)	*(6.73)*
ECM	-0.3779***	-0.3546***
	(-9.2404)	*(-6.7221)*

*Notes: t statistics in brackets. * signifies significant at the 0.10 level, ** significant at the 0.05 level, *** significant at the 0.01 level.*

Overall, the short-run results suggest that credit to the private sector has a negative and significant effect on real per capita GDP. This was evident with annual and quarterly data, as shown in table 3.3. The results using annual data show that a 10 percent increase in credit to the private sector leads to a 0.9

percent fall in real per capita GDP instantly, and the decrease reduces in subsequent periods (0.5 percent after one lag). Likewise, quarterly data shows an instantaneous decline in real per capita GDP of 4 percent, following a 10 percent increase in credit to the private sector, after which the effect is positive and significant, after one lag.

This finding is in contrast to those of most previous studies, which find a positive and significant relationship. It is, however, not surprising to find a negative and significant effect in the case of Kenya. De Gregorio & Guidotti (1995), using the same measure of private credit to GDP to proxy for bank development, find a negative effect of finance on growth in 12 Latin American countries, which they attribute to financial liberalisation in a poor legal environment. These results are a puzzle given the positive effect of credit to the private sector on growth that they find using a different dataset[35], leading to the conclusion that the effect of banking sector development on growth, although generally positive, changes according to region, time period, and levels of income of the country under study.

Studies have also shown that the effect of credit to the private sector from deposit taking institutions on growth, is not uniformly positive across all countries. Even when positive, the size of the effect differs across countries, as shown by (Rioja and Valev, 2004a). In their study of 74 developing and developed countries, they find that countries that had not increased their credit to the private sector significantly recorded poor growth, for example Senegal and Haiti. This is in comparison with those who did, like Thailand and Cyprus. Demirguc-Kunt & Detragiache (1999) also note that a negative effect of finance on growth happens when the economy has experienced a banking crisis. Ram (1999), too, shows that correlational patterns between financial indicators and economic growth differ in inter-country studies

In Kenya, the early 1990s were characterised by a financial sector that operated in a weak legal and regulatory framework. As a result, thirteen commercial banks and thirty one NBFIs were in serious state of financial distress. This included two of the four largest commercial banks at the time (UNECA, 1996), Reports also show that a large proportion of nonperforming loans was due to poor lending practices inherited from the past, and external influence, mostly on state influenced banks (CBK, 2007). This could explain the negative sign on the coefficient on credit to the private sector.

Studies have shown that the presence of a large share of foreign banks could have a negative effect on financial deepening and inclusion (Beck, 2013). The reason behind this is that foreign banks have a

[35] They use Barro's (1991) cross country data on both developed and developing countries, and extend it by including credit to the private sector as an explanatory variable.

tendency to refrain from lending to small and medium enterprises (SMEs) (see Mwega 2014), which form the majority of enterprises in less developing countries, thus limiting the effects of private sector credit on growth. In Kenya, the banking sector includes local and foreign banks, accounting for 32.2 % and 43% respectively of the banking sector's net assets as at 2012 (Mwega, 2014).

To test the stability of the models above, we use the CUSUM squared test of Brown et al. (1975). This test is based on the constancy of the coefficients over time, and it looks at the cumulative sum of the recursive residuals. The model is said to be stable if the cumulative sum lies in the area between the two critical lines. While Brown et al. (1975) propose the use of CUSUM and CUSUM of squares for a stability test, Caporale & Pittis (2004) show that the CUSUM of squares is robust to the presence of endogenous regressors in both a stationary and a cointegration environment, unlike the CUSUM, which is only robust in a stationary environment. The latter is also unable to detect parameter instability when structural invariance fails. Thus the CUSUM of squares is more powerful than the CUSUM. Results (shown in Appendix B.8) show that the model is stable.

3.5.2 Stock markets and economic growth

We test the independent effect of stock market development on growth, using both stock market capitalisation and stock market value traded as proxies for stock market development. These variables have been used extensively in previous studies to proxy for this purpose (Rousseau and Wachtel, 2000; Arestis, Demetriades and Luintel, 2001; Beck and Levine, 2004). We begin by establishing the existence of a long-run relationship, using the ARDL bounds test approach. The results (shown in appendix B.4) point to the existence of cointegration when the stock market value traded variable is used. However, no cointegration is found when the market capitalisation variable is used.

The long-run and short-run results are shown in table 3-3 and table 3-4 respectively. We report results using stock market value traded. The long-run results show a positive and significant effect of stock market development on growth. As Levine (1996) notes, the ability to trade and issue securities in the stock market is what facilitates long-term growth. It is therefore no surprise that we find a positive and significant long-run effect of stock market development on growth. A 10 percent increase in value traded leads to a 0.1 percent increase in real per capita GDP.

Table 3-4: Long-run Results: Stock Market Development and Growth

Long-run estimation results *Dependent variable: Log of real per capita GDP*	
Selected model	(1, 0, 0, 0, 0)
MACT	0.0107**
	-(2)
LNTRADE	0.1564***
	-(7.2)
LNGOV	0.007
	-(0.3)
INF	-0.0022**
	(-2.4941)
D08Q1	-0.0928**
	(-2.4952)
D04Q2	(-0.0963**)
	(-2.2471)
D09Q3	-0.059*
	(-1.9528)

*Notes: t statistics in brackets. * signifies significant at the 0.10 level, ** significant at the 0.05 level, *** significant at the 0.01 level.*

In the short-run, we still find a positive and significant effect, with a 10 percent increase in value traded leading to 0.03 percent increase in real per capita GDP. Using both market capitalisation and value traded produced similar outcomes. Our results are similar to findings by Beck & Levine (2004), who find that stock markets have a positive influence on growth.

Table 3-5: Error Correction Representation of the ARDL Model

Error Correction Representation of the ARDL Dependent variable: log of real per capita GDP	
Selected model	(1, 0, 0, 0, 0)
D(LNMACTSA)	0.0037*
	(1.89)
D(LNTRADE)	0.0784***
	(3.82)
D(LNGOV)	6.00E-04
	(0.10)
D(INFLATION)	-6.00E-04
	(-1.1137)
D(D08Q1)	-0.0511***
	(-6.060)
D(D04Q2)	-0.0245***
	(-2.8013)
D(D09Q3)	-0.013
	(-1.6359)
C	3.392
	(5.07)
CointEq(-1)	-0.4363***
	(-5.0632)

*Notes: t statistics in brackets. * signifies significant at the 0.10 level, ** significant at the 0.05 level, *** significant at the 0.01 level.*

3.5.3 Financial structure and economic growth

Having established the independent role of banks and the stock market on growth, we now look at the effects of financial structure on economic growth. As stated earlier, we proceed by first estimating the effect of the components of financial structure on growth, before estimating the model with the overall financial structure index. The bounds test results (appendix B.4) are inconclusive when we include the financial structure components. Nevertheless, we proceed to estimate the long-run relationship, since we do not rule out its existence.

Our interest is in the significance of the coefficients on the financial structure variables, to determine if financial structure matters. The long-run results show a significant coefficient on FSACT, implying that financial structure is important for economic growth. But as noted earlier, in order to conclude whether banks or the market matter more, we need to consider the sign of the coefficient. The bank-based view predicts a negative and significant relationship between the financial structure measures and growth, while the market-based view predicts a positive and significant relationship (see Levine 2002; Arestis et al. 2004). Our results show that, in the long-run, stock market activity is more conducive to growth than activity in the banking sector. This is not surprising, as our analyses discussed in the previous section

showed a negative effect of banks and a positive effect of the stock market. The coefficient on FSSIZE is, however, insignificant, which implies that financial structure does not matter for growth.

The short-run results, however, show significant coefficients on both FSACT and FSSIZE, leading to the conclusion that financial structure is influential in economic growth. However, the conclusion regarding which financial institutions are more conducive to growth differs for the two components. While FSACT leads us to conclude that banks are more important for growth than stock markets, FSSIZE gives the opposite information, that stock markets are more important than banks for growth. These results are contrary to the findings of Levine (2002) who finds no significant effect of financial structure components on growth. They are, however, in line with conclusions by Arestis, et al. (2004) in five of the six countries evaluated, and Luintel, et al. (2008) in seven[36] of the fourteen countries they cover, that financial structure matters for growth. We compare these results with the overall financial structure index.

[36] Argentina, Brazil, Greece, India, South Africa, South Korea, and Taiwan

Table 3-6: Long-run Estimation Results using Financial Structure Indicators

Long-run estimation results		
Dependent variable: Log of real per capita GDP		
Selected Model	(3, 4, 4, 0, 0, 0)	(1, 2, 4, 4, 3)
	(1)	(2)
LNFSACT	0.0477*	
	(1.90)	
LNFSSIZE	-0.059	
	(-1.1859)	
LNFSINDEX		0.0072
		(1.117)
LNTRADE	0.1994***	0.1837***
	(8.54)	(5.87)
INFLATION	-0.0023*	-0.0047***
	(-1.9955)	(-4.2463)
LNGOV	*0.00*	-0.0255
	(-0.2046)	*(-0.8669)*
D08Q1	-0.1178***	-0.0631***
	(-2.9519)	*(-2.8369)*
D06Q2		-0.0431*
		(-1.9846)
D04Q2	-0.0840**	-0.0433*
	(-2.5328)	*(-1.7096)*
D11Q4	0.0697**	
	(-2.11)	
D03Q1		-0.0347*
		(-1.8271)
D09Q3		-0.0742***
		(-2.7992)

*Notes: t statistics in brackets. * signifies significant at the 0.10 level, ** significant at the 0.05 level, *** significant at the 0.01 level.*

Table 3-7: Error Correction Representation of the ARDL Model

Error Correction Representation of the ARDL		
Dependent variable: Log of real per capita GDP		
Selected Model	(3, 4, 4, 0, 0, 0)	(1, 2, 4, 4, 3)
	(1)	(2)
D(LNRPCGDP2(-1))	-0.2689**	
	(-2.5872)	
D(LNRPCGDP2(-2))	-0.1978**	
	(-2.3871)	
D(LNFSACT)	4.00E-04	
	(0.16)	
D(LNFSACT(-1))	-0.0166***	
	(-4.4072)	
D(LNFSACT(-2))	-0.0129***	
	(-3.9438)	
D(LNFSACT(-3))	-0.0105***	
	(-4.570)	
D(LNFSSIZE)	0.0648***	
	(3.84)	
D(LNFSSIZE(-1))	0.003	
	(0.090)	
D(LNFSSIZE(-2))	0.0707**	
	(2.66)	
D(LNFSSIZE(-3))	0.0678***	
	(3.060)	
D(LNFSINDEX)		-0.0059
		(-1.4875)
D(LNFSINDEX(-1))		-0.0052
		(-1.3434)
C	3.0487***	5.1696***
	(7.170)	(7.593)
CointEq(-1)	-0.409***	-0.6572***
	(-7.158)	*(-7.5855)*

*Notes: t statistics in brackets. * signifies significant at the 0.10 level, ** significant at the 0.05 level, *** significant at the 0.01 level. Only the financial structure indicators are presented in the results. Complete results are shown in appendix B.7*

The ARDL bounds test for cointegration (appendix B.4) shows that a long-run relationship exists when we use the FSINDEX, given the significant F-statistic which leads us to reject the null hypothesis of no long-run relationship. This conclusion is further supported by the negative and significant coefficient on the error correction term, which tells us the speed of adjustment.

Results on column (2) of table 3-6 show an insignificant coefficient on the FSINDEX, leading us to conclude that financial structure is not important for economic growth in the long-run. These results are similar to the short-run results shown in column (2) of table 3-7.

Previous studies have found mixed results, with Levine (2002) and Beck & Levine (2002) showing that financial structure does not matter, and Arestis et al. (2004), Luintel et al. (2008) concluding the opposite.

Overall, our results are mixed. While the FSINDEX produced consistent results, both in the short-run and the long-run, the financial structure components produce conflicting results. As was noted earlier, empirical studies on the influence of financial structure on economic growth have not been conclusive. This has partly been attributed to the use of different measures of financial structure, as well as the different approaches used. However, it is possible that each component captures something unique about the financial structure. The index combines information from each component, and based on results from using the index, we can conclude that financial structure does not matter for economic growth in the short-run and the long-run.

In the estimations involving the components of financial structure, trade openness is seen to have a positive and significant effect on growth, while inflation has a negative and significant effect, in line with theoretical predictions. However, government expenditure is seen to enter the estimation insignificantly. We also postulate that the 2007/2008 financial crisis would have had a negative effect on growth, and this is visible in the results, with the time period dummy variable entering the estimations with a negative and significant coefficient. Results using the FSindex give a different picture, with the selected model having a longer time lag. Overall, trade openness has an initial positive and significant effect, but a negative and significant effect on growth in the lagged periods. These results are shown in appendix B.7.

3.6 Conclusion

This study sought to establish both the short-run and the long-run relationship between financial structure and economic growth for Kenya. We used the ARDL bounds approach to cointegration to estimate this relationship. While the area of finance and growth has been widely researched, emerging issues continue to cast doubt on the widely held beliefs that there is a definite positive relationship between finance and growth. The recent global financial crisis drove researchers to question the positive link between finance and growth (Rousseau and Wachtel, 2011). Apart from the literature on finance and growth, special attention has been paid to the structure of the financial system and its determining effect on growth. The present study falls into this category. We sought to empirically investigate the relationship between

financial structure and economic growth in a lower-middle income country, Kenya. This study involved an evaluation of three scenarios. In the first, we considered the independent role of banks in economic growth. In the second, we investigated the independent influence of the capital market. Finally, we examined the role of financial structure in economic growth.

The results show that, in the short run, banking sector development has a negative and significant effect on growth, independent of the influence of the capital market. The effect of stock market development is positive and significant in the long-run, but insignificant in the short-run, independent of the influence of the banking sector. The effect of development in the banking sector is mostly insignificant in the long run. This is attributed to poor lending practices in Kenya and external political influence on bank loans in the 1980s and 1990s (UNECA, 1996). The 1990s were also a period in which the financial sector was operating within a weak legal and regulatory framework. We, however, expect to observe a reversal of the negative effect of the banking sector on growth if we use quarterly data from a different time period. That is, a period characterized by a financially liberalized banking sector, but this is not the case. This anomaly can be explained by the large proportion of non-performing bank loans carried over from previous periods.

We also considered the influence of individual components of Kenya's financial structure. Results show that financial structure matters in the long-run when we consider FSACT, but that financial structure does not matter when we consider FSSIZE. This leads us to conclude that stock market activity is more conducive to growth than activity in the banking sector, given the positive and significant coefficient. The short-run results, however, show significant coefficients for both FSACT and FSSIZE. Thus we can conclude that financial structure is important for economic growth. These conflicting results can be attributed to the different aspects of the financial system that each component captures. The overall financial structure index, however shows that financial structure is not influential, both in the short-run and long-run, given the insignificant coefficient estimate on FSINDEX. It is on this basis that we conclude that there is no economic value in promoting one financial system over another. Policy should instead be focused on promoting efficient allocation of credit to productive projects that have the potential to contribute to economic growth. Likewise, the Kenyan government should focus on expanding access to credit for small and medium enterprises that form the bulk of private enterprises in the country.

These results show that different conclusions can be reached depending on the variables under consideration. As Demirguc-Kunt et al. (2001) note, though financial structure may seem to have no effect on economic growth, this does not imply that institutions are not important for growth. Rather, it

could be that the indicators used do not fully capture the role of banks and stock markets. A major limitation of the present study is the lack of annual historical data from the Nairobi Securities Exchange. We were thus compelled to use quarterly data which does not match historical annual data from the banking sector. This limited the analysis of the effect of financial structure on growth to 12 years, and the most vibrant period for the stock market in its 63 year history. As a result, we miss valuable historical information that could have informed our analysis. Even though we find that the stock market is significant in influencing growth in the present period, we are not able to evaluate and compare data on the evolution of the country's financial structure prior to the 2002 general election, which boosted investor confidence and led to increased activity in the market.

Appendix B

B.1 Deflating data

One feature of the dataset used in this study is the combination of both flow and stock variables. As Beck, et al. (2000a) note, one is bound to run into problems when getting ratios of such variables. They, however, provide a method to deflate such data, which we adopt for this study, as shown below:

$$FININD_t = \frac{\left\{0.5*\left[\left(\frac{FININD_{et}}{CPI_{et}}\right)+\left(\frac{FININD_{et-1}}{CPI_{et-1}}\right)\right]\right\}}{\frac{GDP_{et}}{CPI_{at}}} \quad \text{(A1)}$$

- Where $FININD_{et}$ and $FININD_{et-1}$ represents the respective financial indicator (in nominal terms) in the current and previous periods respectively
- CPI_{et}, CPI_{et-1} and CPI_{at} are the end of period consumer price indices for the current and previous periods and average CPI at the end of the current period respectively
- GDP_{et} is GDP in the current period.

Since we are making use of quarterly data, to fully characterize the ratio in a particular quarter, we take the average of the quarter (which entails dividing the numerator by 4) to avoid overstating the ratios.

B.2 Unit root test results

a) Bank annual data

	ADF				PP				
Variable	None	Intercept	Trend & intcpt	1st diff	None	Intercept	Trend & intcpt	1st diff	Concl.
LNRPCGDP	1.3568	-1.0496	-1.666	-3.8083***	1.4059	0.1001	-0.764	-3.8083***	I(1)
LNPCR	1.9782	-0.2007	-3.0227	-6.2305***	1.3532	-0.3356	-3.0955	-8.555***	I(1)
LNTRADE	-0.7046	-3.4586**	-3.633**		-1.2777	-3.4384**	-3.6427**		I(0)
LNGOV	-0.5908	-1.3458	-2.9575	-6.0444***	-0.7882	-1.3413	-2.9719	-8.6608***	I(1)
LNGFCF	0.192	-2.7125*	-2.6036	-5.3374***	0.6335	-2.6156*	-2.4806	-8.210***	I(0) or I(1)
INF	-1.9908**	-3.7418***	-3.8129**		-1.9908**	-3.7874***	-3.8666**		I(0)

b) Quarterly data

			ADF				PP		
Variable	None	Intercept	Trend & intcpt	1st diff	None	Intercept	Trend & intcpt	1st diff	Concl.
LNRPCGDP	2.3167	0.0598	-3.9390**	-8.0877***	2.7425	0.2875	-3.9974**	-8.2848***	I(0) or I(1)
LNBACT	1.5802	1.1347	1.7227	7.3***	-1.4623	-1.194	-1.6281	-6.9778***	I(1)
LNMACT	-0.4211	-2.5982	-2.5897	-6.486***	-0.9945	-3.6297***	-4.0492**	-15.2745***	I(0) or I(1)
LNMSIZE	-1.1714	-3.293**	3.1845*		1.1587	-3.0504**	-2.2822		I(0)
LNFSACT	-2.7381***	-2.6836*	2.5986		-2.3648**	-3.7225***	-3.7673**		I(0)
LNFSSIZE	-3.0345***	-3.5635**	-3.2885*		-2.7712***	-2.989**	-2.3781		I(0)
LNFSINDEX	-1.3266	-2.6801*	-2.4369	10.1370***	-1.6966	-2.7414*	-2.6569	-10.3632***	I(0) or I(1)
LNTRADE	-3.9922	-0.6911	-2.2998	11.3528***	-5.9629	-0.5248	-3.9639**	-11.9490***	I(1)
LNGOV	4.6309	-0.0340	-3.0953	12.8423***	-3.934	-1.9121	-13.7421***		I(0) or I(1)
INF	3.7207	0.6162	-1.8936	5.2534***	6.7834	1.1409	-1.8349	-5.2482***	I(1)

B.3 Correlation coefficients

a) Annual data

	LNRPCGDP	LNPCR	LNTRADE	LNGOV	LNGFCF	INF
LNRPCGDP	1					
LNPCR	0.621	1				
LNTRADE	-0.385	-0.340	1			
LNGOV	-0.493	-0.606	0.133	1		
LNGFCF	0.431	-0.005	0.240	0.013	1	
INF	-0.157	-0.394	0.448	-0.018	-0.051	1

b) Quarterly data

	LNRPCGDP	LNMACT	LNMSIZE	LNFSACT	LNFSSIZE	LNFSINDEX	LNTRADE	LNGOV	INF	LNPCR
LNRPCGDP	1									
LNMACT	0.392	1								
LNMSIZE	0.663	0.808	1							
LNFSACT	0.297	0.990	0.773	1						
LNFSSIZE	0.468	0.834	0.967	0.827	1					
LNFSINDEX	0.365	0.965	0.882	0.968	0.932	1				
LNTRADE	0.974	0.390	0.662	0.295	0.470	0.367	1			
LNGOV	0.919	0.333	0.601	0.242	0.406	0.307	0.930	1		
INF	0.966	0.290	0.577	0.189	0.362	0.252	0.972	0.937	1	
LNPCR	0.789	-0.066	0.168	-0.174	-0.086	-0.154	0.776	0.780	0.862	1

B.4 ARDL Bounds test for Cointegration results

			Significance level						
	Estimation using;	F. stat	10%		5%		1%		Conclusion
			Lb	Ub	Lb	Ub	Lb	Ub	
Annual data	PCR	8.0510***	2.26	3.35	2.62	3.79	3.41	4.68	Cointegrated
	DCR	5.1313***	2.26	3.35	2.62	3.79	3.41	4.68	Cointegrated
Quarterly data	PCR	5.2236***	2.45	3.52	2.86	4.01	3.74	5.06	Cointegrated
	MACT	2.0042	2.45	3.52	2.86	4.01	3.74	5.06	Not cointegrated
	MSIZE	3.001*	2.45	3.52	2.86	4.01	3.74	5.06	Cointegrated
	FS_SIZE and FS_ACT	3.004	2.26	3.35	2.62	3.79	3.41	4.68	Inconclusive
	FS index	3.6393*	2.45	3.52	2.86	4.01	3.74	5.06	Cointegrated

B.5 Long-run Estimation results using DCR

Long-run estimation results	
Dependent variable: Log of real per capita GDP	
Selected model	(2, 1, 0, 1, 3, 0)
LNDCR	-0.2459
	(-1.036)
INFLATION	-0.0066
	(-1.523)
LNTRADE	-0.1114
	(-0.666)
LNGOV	-0.5950***
	(-2.995)
LNGFCF	1.0311**
	(2.52)
D02	-0.2481*
	(-1.767)
D00	-0.2995**
	(-2.180)

*Notes: t statistics in brackets. * signifies significant at the 0.10 level, ** significant at the 0.05 level, *** significant at the 0.01 level.*

B.6 Short-run estimation results using DCR

Error Correction Representation of the ARDL *Dependent variable: Log of real per capita GDP*	
Selected model	(2, 1, 0, 1, 3, 0)
D(LNRPCGDP(-1))	0.2581**
	(2.595)
D(LNDCR)	-0.1015***
	(-4.110)
D(INF)	-0.0012***
	(-4.634)
D(LNTRADE)	0.0507**
	(2.273)
D(LNGOV)	-0.0521
	(-1.646)
D(LNGOV(-1))	0.0266
	(0.824)
D(LNGOV(-2))	0.1589***
	(5.378)
D(LNGFCF)	0.1325***
	(5.536)
D(D02)	-0.0354***
	(-4.569)
D(D00)	-0.0337***
	(-4.386)
Constant	1.7185***
	(7.686)
ECM	-0.1532***
	(-7.666)

*Notes: t statistics in brackets. * signifies significant at the 0.10 level, ** significant at the 0.05 level, *** significant at the 0.01 level.*

B.7 Short-run estimation results using Fsindex

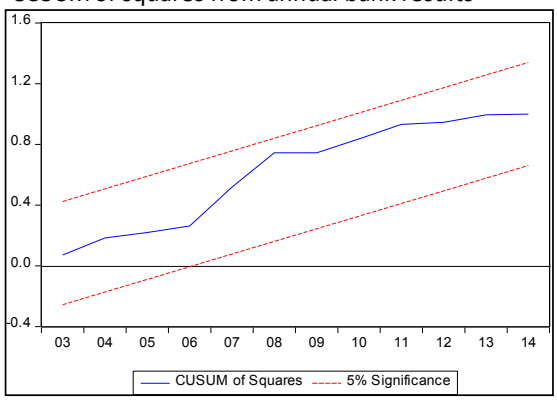
Error Correction Representation of the ARDL		
Dependent variable: Log of real per capita GDP		
Selected Model	(3, 4, 4, 0, 0, 0)	(1, 2, 4, 4, 3)
	(1)	(2)
D(LNRPCGDP2(-1))	-0.2689**	
	(-2.5872)	
D(LNRPCGDP2(-2))	-0.1978**	
	(-2.3871)	
D(LNFSACT)	4E-04	
	(0.16)	
D(LNFSACT(-1))	-0.0166***	
	(-4.4072)	
D(LNFSACT(-2))	-0.0129***	
	(-3.9438)	
D(LNFSACT(-3))	-0.0105***	
	(-4.570)	
D(LNFSSIZE)	0.0648***	
	(3.84)	
D(LNFSSIZE(-1))	0.003	
	(0.09)	
D(LNFSSIZE(-2))	0.0707**	
	(2.66)	
D(LNFSSIZE(-3))	0.0678***	
	(3.06)	
D(LNFSINDEX)		-0.0059
		(-1.4875)
D(LNFSINDEX(-1))		-0.0052
		(-1.3434)
D(LNTRADE)	0.0658***	0.0571***
	(4.16)	*(3.1786)*
D(LNTRADE(-1))		-0.0831***
		(-3.8102)
D(LNTRADE(-2))		-0.0849***
		(-3.7177)
D(LNTRADE(-3))		-0.1297***
		(-5.1604)
D(INFLATION)	-0.0009**	-0.0020***
	(-2.2036)	*(-4.4016)*
D(INFLATION(-1))		0.0021***
		(4.121)
D(INFLATION(-2))		0.0010*
		(1.967)
D(INFLATION(-3))		0.0015***
		(3.567)
D(LNGOV)	-0.005	-0.0031
	(-1.2157)	*(-0.5164)*
D(LNGOV(-1))		0.0162**
		(2.32)
D(LNGOV(-2))		0.0268***
		(4.19)
D(D08Q1)	-0.0449***	-0.0453***
	(-6.7664)	*(-6.8438)*
D(D04Q2)	-0.021***	-0.0259***

	(-3.0888)	*(-3.7104)*
D(D11Q4)	0.0228***	
	(3.63)	
D(D09Q3)		-0.0427***
		(-4.6599)
D(D06Q2)		-0.0326***
		(-4.3951)
D(D03Q1)		-0.0130*
		(-1.9433)
C	3.0487***	5.1696***
	(7.17)	*(7.593)*
CointEq(-1)	-0.409***	-0.6572***
	(-7.158)	*(-7.5855)*

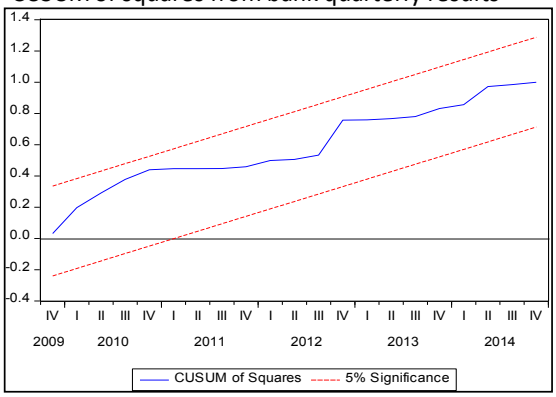
*Notes: t statistics in brackets. * signifies significant at the 0.10 level, ** significant at the 0.05 level, *** significant at the 0.01 level.*

B.8 Model stability: CUSUM of Squares test results

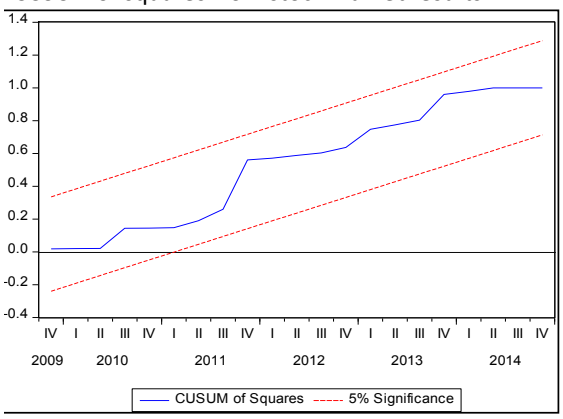
CUSUM of squares from annual bank results



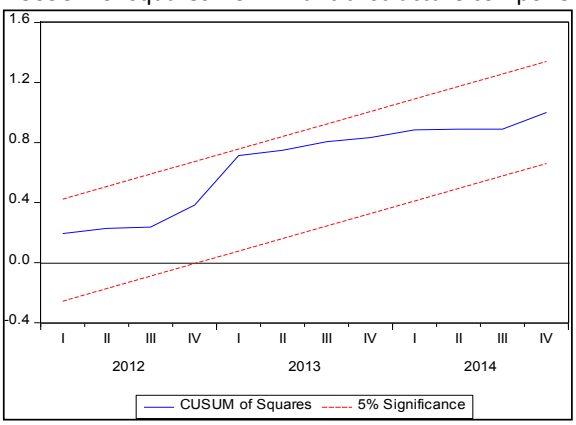
CUSUM of squares from bank quarterly results



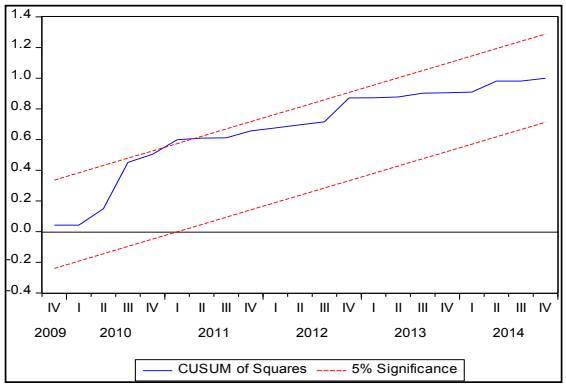
CUSUM of squares from stock market results



CUSUM of squares from financial structure components



CUSUM of squares from FSINDEX results



Chapter 4

Firm Financing Choices and Productivity in Sub Saharan Africa: Evidence from Firm Level Data

4.1 Introduction

Finance plays a crucial role in the performance of firms by providing the necessary funds for investments. However, the financial structure in a country determines the financing choices that are available to firms. As Girma & Vencappa (2015) note, the financial system stimulates economic efficiency and offers more profitable growth opportunities. But for this to happen, firms should be able to access finance from the financial system. The sources of firm finance vary from one country to another, and are dependent on a number of factors, including costs, benefits, accessibility (Myers, 1984), institutional differences (Beck, Demirgüç-Kunt and Maksimovic, 2008), and the legal and financial environment (Porta *et al.*, 1998; Allen *et al.*, 2012). The choice of firm financing is a conscious decision made by firms (Mallick and Yang, 2011). Choices include acquiring debt, using equity, sourcing internal funds, obtaining trade finance, and informal funding (borrowing from friends and family), among others.

Even though the effect of firm financing choices on firm performance has been broadly studied in the corporate finance field, there has not been consensus, and what has emerged are conflicting predictions, given the different conclusions of the different theories of capital structure[37]. For example, the Modigiliani & Miller (1958) "irrelevance theory" postulates that capital structure has no effect on firm performance. On the other hand, the agency cost theory by Jensen & Meckling (1976) posits that firms with higher debt levels have higher productivity, because higher debt levels reduce the agency cost of equity, thereby increasing firm value, as managers are constrained to act in the interest of shareholders.

Rahaman (2011) further notes that our understanding of the real effects of financial structure at a more disaggregated level is limited. The sources of firm finance are by-products of financial development in the country (Mallick and Yang, 2011). Theory states that countries with better developed financial systems ease external financing, especially the use of bank funds that are marked by information asymmetries between firms and banks. Other factors that determine firms' decisions on which source of finance to utilize are highlighted in the corporate finance literature. These include conflict of interest between firms and providers of funds or between shareholders and managers of a firm, or between equity-

[37] Capital structure and financial structure have been used interchangeably in the corporate finance literature, in reference to firm financing. See for example Davis & Stone (2004); Wippern (1966); Salim & Yadav (2012)

holders and debt-holders within a firm. Another factor is market imperfections. Girma & Vencappa (2015) note that different types of finance have different properties, and their effect on firm productivity varies across firms.

Firms of different sizes have access to different sources of finance. For example, large firms often have access to both bank and market finance in countries with financial markets, while small and medium size firms[38] have limited access to market finance, given the stringent listing requirements. They instead have access to other forms of finance including (but not limited to) internal/retained funds, trade credit, borrowing from banks, family and friends, or owners' equity. Likewise, the legal and regulatory framework in a country has a direct influence on the financial system. Studies have shown that countries with well-developed legal systems are more likely to have well developed financial systems. As a result, firms in different countries are faced with different financial environments. While some countries are able to provide external finance to firms, others must rely on internal sources of finance. Cross listing of firms in different financial markets has also broadened the sources of firm financing. Firms are negatively affected when they have limited financing choices and are forced to forego investment opportunities. Rahaman (2011) observes that firms resort to internal financing when faced with constraints in external financing. As these constraints are alleviated, firms move away from internal financing to reliance on external financing (Rahaman, 2011). Overall, a firm's choice of finance source depends on its objective of minimizing the cost of finance while maximizing the value of the firm.

Few studies look at firm financing and productivity, especially in developing countries. For example, studies by Allen et al. (2012) and by Girma & Vencappa (2015) look at firm financing in India. While Allen et al. (2012) find that bank and market finance are not associated with higher growth rates for firms, Girma & Vencappa (2015) find that bank and non-bank finance have a positive effect on the productivity growth of firms, with bank loans having the largest effect. They confirm that the size of a firm is important in determining how finance affects productivity growth. They find that large firms rely more on non-bank finance, and small firms rely more on bank finance. Financial structure determines the financing choices of firms. It is therefore important to go beyond analysing the effect of financial structure at the aggregate (economy) level and understand the effect of firm financing on firm productivity.

[38] Which form the majority in developing countries, (Beck et al., 2008)

The overall objective of this study is therefore to investigate the effect of firm financing choices on firm productivity. The contribution of this study is therefore threefold. First, it provides empirical evidence using both parametric and non-parametric estimation methods. Second, it focuses on a region that has not been analysed in the context of firm financing and productivity and third, it makes use of a dataset that has not been fully exploited, made available by the World Bank. Using data obtained from the World Bank Enterprise Survey (WBES) for a sample of manufacturing firms in 26 countries in SSA, we consider firms that purchased fixed assets during the survey period. We are able to distinguish between internal sources of funds, bank loans, equity, informal sources of finance, as well as trade credit. We measure productivity as the firm's total factor productivity (TFP). This will be estimated at firm level for each of the countries in the sample, using both parametric and non-parametric methods. The parametric method follows the standard regression analysis, while the non-parametric method follows the relative distribution approach by Handcock & Morris (1998). To the best of our knowledge, this is the first study that combines both parametric and non-parametric estimation methods in analysing the effect of firm financing on firm productivity in SSA. We thus contribute to the existing literature by providing empirical evidence from SSA, a region that has not been studied due to data limitations.

The rest of the chapter is organised as follows: Section 4.2 looks at the theoretical and empirical literature, while section 4.3 looks at firm financing in Africa. The data and methodology are presented in section 4.4, while the results are presented in section 4.5. Finally, section 4.6 concludes the work undertaken.

4.2 Literature review

4.2.1 Theoretical literature

Firms' financing decisions can be reviewed in the context of the theory of capital structure, which considers the decision between internal and external (debt and equity) sources of finance to fund investment projects. Even though our study extends beyond these two sources of finance, the theory of capital structure informs our analysis. Financing choice by a firm is a complex process and theories can only explain a facet of this complexity (Margaritis & Psillaki, 2010). A number of theories have been developed that help explain the link between the choice of firm financing, and the effect on performance[39].

[39] There are several measures of firm performance. They include those fashioned from financial statements or stock market indicators, such as return on assets (ROA), and stock price returns, margins. Others include revenues, profitability, production efficiency, labour and capital productivity, and employment growth. In this study, we focus on productivity.

Ever since Modigiliani & Miller (1958) developed their Irrelevance Theory, financial economists have come up with alternative theories that explain a firm's financial structure. The Irrelevance Theory states that financial policy is irrelevant for firm performance. The implication is that the cost of capital and the value of a firm do not change with a change in a firm's leverage position[40]. This means that a firm's financing decisions have no effect on the cost of capital or on the value or real operations of the firm (Yazdanfar & Ohman, 2015). This assertion is based on the assumption that a firm does not retain earnings, and all total earnings are paid out as dividends, nor does it pay corporate taxes. It also assumes the existence of perfect capital markets, and the absence of agency costs, moral hazard, and information asymmetry. Thus, one assumes that management acts in the best interest of stockholders, where common stock is a source of finance besides debt (Modigiliani & Miller, 1958). However, this theory has been criticized for it's unrealistic assumptions, with the assertion that altering the assumptions could produce results that show that indeed, a firm's financial structure matters (Stiglitz, 1988).

Contrary to the above theory, the seminal work by Jensen & Meckling (1976), argues that a firm may be under the management of an outsider. They state that an outsider is bound to engage in activities that do not necessarily maximise the value of the firm, and these can be seen in the financing decisions a firm undertakes. In this setting, a firm is governed by contractual arrangements between the owner(s) of the firm as the principal(s), and the manager(s) as the agent(s). Such an arrangement brings with it agency costs, which arise because managers will not always act in the interest of the principal, especially if they are both utility maximizers. When the manager's ownership claim on the firm is low, his incentive to increase the value of the firm decreases, and this could lead to reduced firm performance. Managers may also divert firm resources for their own gains, which may be in conflict with the interests of the owners. Principals must therefore incur monitoring costs to ensure agents do not divert from the core business. At the same time, agents can also bond themselves to the firm, so that they will not take any action that will harm principals, or will ensure that principals are well compensated. When firms are managed by their owners, theory states that they will behave differently, from a situation in which there is outside control, either from equity holders or debtors. In such situations, agency costs arise because of the existence of divergent interests between owner/managers and the shareholders.

The use of debt to finance firm activities is seen to reduce agency costs, in that it reduces the amount of free cash available to managers to use for personal gain (Jensen, 1986; Stulz, 1990). Creditors also

[40] Leverage is defined as the ratio of debt to equity in a firm, on the assumption that these are the only two sources of firm finance

increase their monitoring of firms in such cases, and managers respond by increasing firm profitability to ensure there are enough funds to meet the legal repayments (Ang, Cole and Lin, 2000). The use of debt, however, comes with the threat of bankruptcy. According to Grossman & Hart (1982), though, the threat of bankruptcy can ruin a manager's reputation and to avoid this, a manager may ensure the firm remains profitable. This would improve firm performance. Contractual arrangements between owners and managers, should ensure that managers work hard to make the firm profitable. These firms are thus more likely to be characterised by high productivity.

Another departure from the irrelevance theory is the trade-off theory of financial structure, which posits that there are costs and benefits to using debt to finance investments. The main departure of this theory from the irrelevance theory is the introduction of the notion of taxes which make debt more favourable because interest payments are tax deductible. According to Myers (1984), firms trade-off between the interest tax shields and the dead-weight bankruptcy costs introduced by debt. This means that a firm will consider whether to use debt or equity in its financial structure in a bid to arrive at an optimum mix that adds more value to the firm. Theoretically, it is postulated that high performing firms will opt for higher debt levels, up to the point where additional borrowing increases the probability of financial distress.

An alternative to the trade-off theory is the pecking order theory. The departure of this theory from the irrelevance theory is the introduction of asymmetric information. This theory is based on the premise that a firm prefers internal sources of finance over external sources, in the presence of adverse selection (Myers, 1984). In this case, it is assumed that managers know the true state of the firm better than outsiders. According to this theory, the first preference in terms of finance is internal finance, followed by debt, then equity. Where internal finance is not adequate for a firm's investment requirements, the firm will opt for low risk debt financing before resorting to equity finance. With adverse selection, the choice of finance acts as a signal to outside investors. When the manager believes the firm is overvalued, he will issue equity, as opposed to when the firm is undervalued. Likewise, when the probability of default is high, a manager may incur debt just before this information is available to others.

The pecking order theory posits that the capital structure is designed to mitigate the inefficiencies in the firm's investment decision caused by asymmetric information (Harris and Raviv, 1991). A firm characterised by little tangible assets relative to its value, and subject to severe information asymmetries will have a high debt value, compared to one with more tangible assets and less severe information asymmetries. This arises because of under-investment in new projects financed through equity, when investors believe that the firm is of low quality. Moreover, since the preferred source of finance is internal

finance, the theory predicts that most profitable firms will have lower debt levels, since they do not require external finance. Where external finance is required, debt finance is preferred to equity as debt acts as a signal to investors of the profitability of the firm. Debt also signals that the current stock price of firms that issue shares is undervalued. It is therefore expected that firms that rely on internal funds are more productive than those relying on debt and equity, because use of internal finance signals that the firm is of high quality. Likewise, firms relying more on debt to finance project are expected to be of better quality, thus more productive, because debt signals that a firm is profitable enough to be able to repay the debt.

4.2.2 Empirical literature

There is a large amount of empirical evidence, with varying conclusions, on the influence of firm financing on firm performance (Nucci et al., 2005; Rahaman, 2011; Berger & Di Patti, 2006; Margaritis & Psillaki, 2010; Allen et al., 2012). Performance in these studies is measured using different variables. These include profitability (Ramadan, 2015), ,financial ratios obtained from balance sheets and income statements that include among others, return on investment (ROE), earnings per share (EPS), stock market returns and their volatility, Tobin-q (Berger & Di Patti, 2006), and productivity (Gatti & Love, 2008).These variables are obtained from financial statements, except productivity, which is estimated from the production process. These studies are based on the premise that the financing choices of firms can influence both managerial and firm behaviour, with implications for firm performance.

For example, Nucci et al. (2005) provide evidence that profitable firms in Italy tend to borrow less, and mainly rely on internal finance. While this supports the pecking order theory of financial structure, it contradicts the trade-off theory. Berger & Di Patti (2006) on the other hand show that firms with higher debt than equity perform better than firms with lower debt than equity. The explanation for this is that higher debt levels reduce the agency cost of equity, thereby increasing firm value as managers are constrained to act in the interest of shareholders.

Some empirical evidence also shows a negative relationship between productivity and certain sources of financing. For example Pushner (1995), using distributional analysis on Japanese firms, finds that firms with low leverage show above average levels of productivity. Their analysis follows from an examination of the distribution of productivity residuals within firms' leverage ratios. The study also finds that firms with moderate levels of leverage seem to have less-within firm variation in productivity. This contrasts the hypothesis that higher leverage can discipline management to operate firms as efficiently as possible by ensuring high levels of productivity. This cannot be generalised to all countries, as firm financing

choice is dependent on the financial structure of the country, as well as the cost and accessibility of finance.

High debt levels can have a negative effect on productivity because firms engaged in more innovative activities are not likely to be funded by banks if they lack tangible assets. These results hold in countries with developed financial markets, which offer an alternative to debt finance. In countries with underdeveloped or inactive financial markets, the option of equity becomes very limited (Nucci *et al.*, 2005). Lower debt levels are associated with higher intangible assets because innovative firms are more likely to make use of equity than debt. Equity finance does not require collateral in the form of tangible assets. These conclusions contrast with findings by Margaritis & Psillaki (2010). They find a positive and significant relationship between firm performance and leverage, in their study of French firms, in which they measure leverage as the debt to total asset ratio).This supports the agency cost hypothesis that higher leverage is associated with improved firm performance.

However, it is not only debt that is associated with higher firm performance. In a study of both quoted and unquoted firms in the UK, Rahaman (2011) finds a positive effect of both external and internal finance on firm growth. They do, however, argue that firms with external credit constraints are most likely to use bank credit, with increased use of internal finance acting as a signal for future bank credit. They also show that small firms are more likely than large firms to use internal funds. The study concludes that the effects of firm financing on growth are statistically significant and quantitatively important, and that reliance on internal finance declines as constraints to external finance are eliminated, an indication that financial structure matters at firm level. Rajan & Zingales (1995) also reveal that firms relying on external finance grow faster, but that this requires a well-developed financial market.

Another branch of related literature investigates the effect of bank influence on firm growth and financing choices, and finds that firms influenced by banks benefit from increased access to credit. These studies also find that debt has a negative influence on profitability, with no indication that bank influence on a firm promotes its growth or profitability (Agarwal and Elston, 2001) As noted, some studies postulate that firms that make use of bank loans perform better. They postulate that banks monitor firms and therefore it is expected that they will have stronger growth than those without bank relations, whose performance is not monitored. However, this was not the case in India, one of the largest growing economies in the world. Allen et al., (2012) find that bank and market (equity) finance were not associated with higher growth rates. They show that the single most important form of finance for Indian firms is non-bank and non-market external finance. They test the hypothesis that informal finance is

associated with start-ups which then shift to formal finance. They still, however, find persistence in the use of non-bank and non-market finance for both small and large firms. Thus, for developing countries like India, non-formal finance that is not dependent on legal institutions, and which is backed by mechanisms outside the formal financial system, may be more advantageous in promoting growth and productivity. Such findings show that, indeed, financial structure matters. Alternative forms of finance are a common feature of less developed countries which have underdeveloped financial systems to support bank and market finance. Instead, these countries are characterised by weak legal institutions, and extensive informal sectors supported by informal sources of finance.

It has also been noted that there is a high correlation between firm growth and productivity (Lööf and Heshmati, 2002) and research has shown that finance plays a crucial role in enhancing firm productivity and productivity growth (Levine and Warusawitharana, 2014). These studies show that there is a positive link between external finance and future productivity growth. We note however the observation by Mallick & Yang (2011) that there is no unique and unambiguous equilibrium relationship between financial structure and firm performance. As observed in the literature, while some theories predict a negative relationship, others predict a positive relationship. Still other show no relationship between firm finance and firm performance. Most of these studies use regression analysis, postulating a linear relationship between leverage and firm performance, while controlling for firm characteristics that have been shown to have an effect on performance.

From the above literature, it is evident that finance is an important factor in the performance of firms and the choice of firm finance is crucial. The role of firm financing choices on firm productivity is under-researched, with most studies focusing more on the effect of leverage on firm performance. Besides, most studies derive firm performance from financial statements. In developed countries, firms that rely on equity are more likely to be more productive, but this is not necessarily the case in developing countries. Instead, firms in developing countries are more likely to benefit from an increase in access to credit in an economy that is more bank-based than one that is more market-based, because of limited access to formal financial markets. Given the stringent conditions for listing in a formal stock market, small and medium size firms in developing countries are locked out of the formal financial market. However, they resort to other forms of financing that, like equity and bank loans, have an effect on their productivity. The role of these additional sources of finance on firm performance is not widely researched, yet it has been shown that these sources can exert an influence on firm performance.

4.3 Firm Financing in Sub Saharan Africa[41]

Firm financing patterns differ across countries, and this is due to differences in the development of banks and stock markets, as well as the differences in legal institutions (Demirgüç-Kunt and Maksimovic, 1999) These differences are considered to be more important than differences in industrial affiliation, which too, results to differences in financing patterns (Fan, Titman and Twite, 2012).

Firms in Sub Saharan Africa are as diverse as the countries in this region. Furthermore, this diversity is also seen in the financial systems, and the extant literature on financial structure suggests that firm financing is dependent on the level of financial development in a country, the quality of institutions as well as the legal and financial environment (Beck, Demirgüç-Kunt and Maksimovic, 2008). The rest of this section provides an overview of the financial environment in SSA, aiming to highlight peculiarities and specific features of firm financing in SSA.

4.3.1 Access and Sources of Finance

In general, developing countries tend to have less-developed financial systems, with limited financing choices for firms. Yet, financial constraints have a direct implication on firm performance as well as growth. Surveyed firms from SSA were asked to state how financially constrained they are, and stark differences can be seen between large and small firms. It is expected that small firms face more constraints than large firms. Small firms are defined in the survey as those with between 5 - 19 employees, medium firms as those with between 20 - 99 employees, and large firms as those with over 100 employees. From table 4-1, we see that a larger percent of respondents for small firms view access to finance as a major to very severe obstacle, compared to respondents from both medium and large firms (47%, 35% and 25% respectively). This is mirrored by the larger percent of responses from large firms that see access to finance as no obstacle (34%) compared to small firms (16%).

[41] Based on pooled data from the World Bank Enterprise survey (WBES) collected between 2005 and 2013 for different countries in SSA.

Table 4-1: Obstacles to finance by firm size (% of responses)

Size	No obstacle	Minor obstacle	Moderate obstacle	Major obstacle	Very severe obstacle	Total
Small firms	16.28	16.55	19.86	26.88	20.44	100
Medium firms	24.75	18.86	21.64	20.84	13.91	100
Large firms	34	21.34	19.95	14.83	9.89	100
Total	22.13	18.14	20.45	22.81	16.48	100

Source: World Bank Enterprise Survey

Notes: The table represents responses to the question: How much of an obstacle is access to finance.

Table 4-2 shows the percent of firms that have ties with a financial institution, and we see that fewer small firms (14%) have ties with financial institutions compared to medium and large firms (29% and 41% respectively). This is not surprising, as small firms face major constraints in accessing finance. These findings echo studies that have shown that providing finance to small firms is considered a riskier undertaking than financing large firms. As Beck, et al. (2008) note, inadequate access to external finance is largely attributed to market imperfections, including high transaction costs and information asymmetries. What this means is that small firms are forced to resort to alternative forms of finance, as shown in table 4-3.

Table 4-2: Bank ties by firm size

Establishment has a line of credit or loan from a financial institution (% of responses)		
	No	Yes
Small firms	85.94	14.06
Medium firms	70.71	29.29
Large firms	58.96	41.04
Total	76.27	23.73

Source: World Bank Enterprise Survey

Many firms in Sub Saharan Africa rely on internal finance, which accounts for 73% of the total financing choices[42]. This is followed by bank finance, accounting for 14% of total financing needs. Complete reliance on equity was the least used option, at 3% of the total financing requirement. Collier (2009) notes that growing firms do not rely on retained earnings because growth squeezes cash flows. If productivity drives growth, then the conclusion is that firms in SSA are, on average, not productive and therefore are not growing, given their strong reliance on internal finance.

Differentiating the sources of finance by firm size, we see that the pattern is somewhat different, even though the major source of finance for all firms is still internal funds. These results are shown in table 4-

[42] Results are shown in appendix C.2

3 below. A significant proportion of investment is financed from internal funds for all firms, with small enterprises utilising this option more than both medium and large enterprises 77%, 68% and 66% respectively). The second major source of finance is bank loans, and this was observed across all firms. Likewise, for all firms, very little investment is financed using equity finance (3% across all firms). This is not surprising, as Sub Saharan Africa is mainly characterised by small and mostly inactive financial markets, except Kenya, Mauritius, Nigeria, and South Africa.

Between the two formal sources of external finance (bank and equity), we see that bank funds are the most utilised form of external finance, compared to equity finance for all firms. For example, 9% of investments of small firms are financed from bank loans compared to 3% financed from equity. 19% of the investments of medium and large firms are financed from bank loans, compared to 3% from equity.

Table 4-3: Firm financing patterns by firm size (% of responses)

Size	Bank loan	Equity	Internal funds	Hybrid	Others (Informal)	Total
Small firms	9.29	3.32	77.28	5.89	4.23	100
Medium firms	18.94	3.11	68.12	5.69	4.14	100
Large firms	18.7	2.71	66.82	5.58	6.18	100

Source: World Bank Enterprise Survey
The table represents the proportion of investment financed from the various sources

Comparing sources of finance by country and firm size[43], we see a huge cross country difference in firm financing. For example, small and medium firms in Lesotho rely heavily on bank loans, while large firms rely almost entirely on internal finance. Firms in Mauritius rely more on bank loans than internal finance. The use of bank finance in Nigeria is low for all firm sizes. Burkina Faso has a higher reliance on equity finance for large firms, while small and medium firms did not utilise equity finance. No South African rely on equity finance. This large variation in firm financing is expected, as countries are characterised by diverse levels of financial development as well as by legal institutions of varying strength, which has been shown to have a large impact on how firms finance their investments. The significant use of internal finance is not a unique feature of SSA firms. For example, Beck et al. (2008) show that firms in Germany, the UK and the US use internal finance for a significant portion of their investments.

[43] Selected country results are shown in appendix C.3.

4.3.2 Legal and Institutional Framework

The prevailing view is that efficient and effective legal institutions are instrumental in promoting developed financial systems. The law and finance literature emphasizes the need for a strong legal and regulatory framework that can protect the rights of financial players. It is theorized that when property rights are protected, and rules and regulations are enforced, a country's financial system benefits and develops (Rajan and Zingales, 1996; Porta *et al.*, 1998). Respect for the rule of law is thus crucial for well-functioning financial markets, as well as operational banking institutions. Allen, et al. (2012) posit that the lack of effective legal and other regulatory institutions is one reason financial markets have not played a more prominent role in the Indian economy.

Studies on developing countries have shown that there is a difference between recorded legislation and practice. For example, Allen, et al. (2012) show that, while India has a long history of British common law[44], the level of investor protection and the quality of legal institutions is below the average for former British colonies. They show that these are only slightly better than such protections and institutions in former French colonies. They attribute these differences to the slow and inefficient legal system and corruption in government. This is a common feature in many developing countries.

To proxy for institutional framework, we look at the responses of the firms to the question "How much of an obstacle is corruption". Literature on institutions shows that rent seeking behaviour by interest groups can turn legal institutions into barriers for efficient business operations. The responses are shown in table 4-4 below.

Overall, we see that there are concerns about corruption, with 30% of respondents for large firms reporting that corruption is a major to severe obstacle. Likewise, 33% and 37% of respondents for medium and small firms respectively reported that corruption is a major to severe obstacle. We can infer that small firms are more affected by corruption than large firms. While corruption is not the only measure of inefficiency in financial institutions, it is an indication of a firm's views about the legal and business environment in which they operate. Providing an enabling environment for business ensures that firms will survive, and offers a level playing field for firms to thrive.

[44] Studies show that countries with legal systems inherited from English common law provide stronger legal protection than countries whose legal systems are of French civil law origin

Table 4-4: How much of an obstacle is Corruption (% of responses)

	Small Firms	Medium Firms	Large Firms
No obstacle	26.43	28.49	28.95
Minor obstacle	20.37	20.72	21.4
Moderate	16.49	17.84	19.27
Major	21.61	17.99	18.29
Very severe	15.09	14.96	12.08

Source: Author's computation from World Bank Enterprise Survey
Notes: The responses have been averaged over all firms

We also look at the responses to the question on "fairness and impartiality of the court system". The literature suggests that banks and financial markets that are backed by legal institutions are more accessible to large and listed firms than to small and private firms in most countries (Allen *et al.*, 2012). From the results on table 4-5, we see that respondents for large firms tend to agree or strongly agree more on the impartiality and fairness of the court system, compared to both small and medium firms. For example, 43% of the large firms agree that the courts are fair, compared to 36% and 32% of respondents for medium and small firms respectively.

Table 4-5: Question: The court system is fair, impartial & uncorrupted (% of responses)

	Small Firms	Medium Firms	Large Firms
Strongly disagree	23.99	22.66	20.22
Tend to disagree	28.14	28.37	23.86
Tend to agree	32.03	35.79	42.87
Strongly agree	15.84	13.18	13.05

Source: Author's computation from World Bank Enterprise Survey
Notes: The responses have been averaged over all firms

Firm financing in Sub Saharan Africa is a major concern for policymakers, as firms are important for economic growth. It is therefore crucial that barriers to finance are removed to aid financial development.

4.4 Methodology, Model specification and Data

4.4.1 Estimating productivity

The traditional approach for analysing productivity is to estimate a production function (Ghosh, 2009). This is the approach adopted in this study. We quantify a firm's productivity as the Total Factor Productivity (TFP), in line with studies that evaluate the effect of financing choices on firm productivity (Nucci *et al.*, 2005; Girma and Vencappa, 2015). TFP is defined as the efficiency with which firms

convert inputs into outputs (Saliola and Seker, 2011) and is endogenously determined, using either the gross value of sales or the value added and input choices (Dabla-Norris, Kersting and Verdier, 2010). Variations in the specification of the equation depend on the inputs used, as well as on the dependent variable used. The starting point in all specifications is the general Cobb Douglas production function, with TFP estimated as the residual from the estimations. This is what is commonly referred to as the Solow residual. In this study, we use both gross sales and value added, and compare the results for robustness checks, and include only labour and capital as the factor inputs.

The general specification is expressed as:

$$Y = K^{\alpha k}(AL)^{\alpha l} \tag{4-1}$$

Where Y = Output; K = Capital; A = TFP; L = Labour; αk, & αl are the factor shares for capital and labour respectively. Expressing equation (1) in logarithmic form gives us:

$$Y_i = \alpha_0 + \alpha_1^k K_i + \alpha_2^l L_i + \varepsilon_i \tag{4-2}$$

Equation (4-2) is estimated for each country. Since the data was collected at country level, the values of the above variables were expressed in terms of the nominal local currency. To make the data comparable, we need to convert it to a numeraire currency. We therefore use the US dollar and convert amounts to the 2009 United States Dollar (USD) equivalent. To do this, we first convert the local currency into USD using the average exchange rate for the year in which the survey data was collected. We then deflate using the 2009 US GDP deflator. This method of deflation is similar to the method used by the World Bank (2015).

Labour services are adjusted for human capital, following Caselli (2005). Our survey provides data on the average education level for full time production workers. Thus, human capital is measured as shown in equation (4-3) below.

$$H = L\exp\varphi(s) \tag{4-3}$$

Where;

H is human capital
L average number of employees
s average number of years of schooling.
φ(s) is assumed to be piecewise linear[45].

TFP is thus calculated as the residual from equation (2), given by

$$TFP_i = y_i - \tilde{y_i} \quad (4\text{-}4)$$

Where y_i are the actual values and $\tilde{y}_i$ are the predicted values.

Endogeneity of factor inputs

The traditional OLS estimation of equation (4) above assumes away any possible correlation between productivity shocks and the error term. As stated in the literature, unobservable firm level productivity shocks are positively correlated with the error term (Levinsohn and Petrin, 2003). Firms choose both physical and human capital based on their levels of productivity, and this will be captured in the error term of equation (4-2). The methods that have been proposed in the literature to deal with endogeneity of factor inputs and productivity include the Olley & Pakes (1996) method, and the Levinsohn & Petrin (2003) method. However, as noted in Waldkirch (2014), these methods require time- series information, and this is not available in our data, making the use of these methods infeasible.

To correct for this type of endogeneity, Schiffbauer & Ospina (2010) propose using the previous period values of labour and capital as instrumental variables. Our data contains data on the number of permanent, full-time employees at the time of establishment of the firm. We therefore use the initial labour to instrument for the current period's labour. As noted in the existing literature, investment in physical capital is usually determined at the beginning of the production period.

Thus, to instrument for physical capital, we use the net current book value of fixed assets, on the assumption that this value depends on the amount of capital held at the beginning of the production period.

[45] Specifically, as in Caselli (2005), we have $\varphi(s) = 0.134*s$ if $s \leq 4$; $\varphi(s) = 0.134*4+0.101*(s-4)$if $4 < s \leq 8$; $\varphi(s) = 0.134*4+0.101*4+0.068*(s-8)$if $8 < s$

4.4.2 Methodology and data

We use both a parametric and a non-parametric approach to determine the role of a firm's financing choices in productivity. The parametric approach follows the usual regression estimation analysis, while the non-parametric approach looks at the distribution of productivity across the different firms using different financing choices. Both ought to tell the same story.

4.4.2.1 Non-parametric estimation method

The objective of non-parametric estimation is to examine the distributional differences between and within groups that go beyond a description of statistical summaries of the data. We follow (Handcock & Morris (1998) and compare the distribution of firm productivity corresponding to the different financial choices. This way, we are able to establish the stochastic dominance as well as a ranking for the compared distributions. This methodology has been used mainly to compare income distributions (Petrarca, Ricciuti and others, 2015). It has also been applied to the distribution of productivity of exporting vs non-exporting firms for Spanish manufacturing firms (Delgado, Farinas and Ruano, 2002)and the productivity distribution of foreign owned vs domestic firms in the SADC region (Dunne & Masiyandima, 2016). The methodology is, however tailored to our application, using the distribution of firm productivity based on firm financing choices.

Given the different sources of finance, we need to establish a reference group[46] as well as a comparison group. This allows us to compare the productivity of users of one source of finance against the productivity of users of another source. The first step is to compute the Cumulative Distribution Function (CDF) of productivity, in which case our productivity measure, TFP, is as defined above. The sources of finance available in the data are as defined in section 4.3.1, which include bank loans, equity funds, internal funds, informal sources, and a hybrid of the sources.

We denote the CDF of productivity for the reference group as $F_0(y)$ and $F(y)$ for the comparison group. We choose bank funds as the comparison group and each category of the other sources will be used as the reference group. Let Y_0 and Y denote random samples from F_0 and F respectively. The grade transformation of Y to Y_0 is defined as the random variable

$$R = F_0(Y) \tag{4-5}$$

[46] Group refers to firms utilising a given financing option.

The realisation of R, is referred to as the relative data, r whose CDF can be expressed as;

$$G(r) = F\left(F_0^{-1}(r)\right) \tag{4-6}$$

Where $0 \leq r \leq 1$.

The relative data, r, which represents the proportion of values, is interpreted as the percentage rank that the original comparison value would have in the reference group. The relative distribution is therefore defined as the fraction of firms in the reference group to the fraction of firms in the comparison group in each decile of the distribution of productivity. $F^{-1}(r)$ is the quantile function of F_0. The relative probability density function (PDF) of R is given by;

$$g(r) = \frac{f\left(F_0^{-1}(r)\right)}{f_0\left(F_0^{-1}(r)\right)} \tag{4-7}$$

If the distributions of the reference and comparison groups are identical, the CDF of the relative distribution is a 45^0 line and the PDF of the relative distribution is the uniform PDF (Handcock & Morris, 1998). From the above, we are able to graphically establish if there exists stochastic dominance in the productivity of firms financed from a particular financing option. The relative PDF, the density ratio, is the ratio of the fraction of firms in the comparison group to the fraction of firms in the reference group at a given level of productivity.

4.4.2.2 Parametric estimation

Given the lack of data for more than a single period for most of the SSA countries, we make use of a static model as use of a dynamic model is not possible[47].

We model a linear relationship between a firm's productivity and its sources of finance, taking into account other firm characteristics that have an influence on productivity. We specify the equation as follows:

$$prod = \beta_0 + \beta_1 finance + \beta_2 X_i + \delta_l + \lambda_t + \nu_j + \eta_s + \epsilon_i \tag{4-8}$$

[47] For some countries, data exists for more than one period. However, we are not in a position to exploit the panel aspect of the data because of too few time periods.

Where; $prod$ = productivity estimated from equation (2) above;

$finance$ = The financial structure variable and it is identified as the proportion of investment financed from the various sources of finance. These sources include bank loans (from commercial banks and non-bank financial institutions), equity finance (including owners' equity for private firms and public equity for publicly listed firms), internal funds, trade credit and informal sources which include borrowing from family, friends and other informal money lending sources. To classify a firm as bank financed, most of their investment must have been financed from bank loans, obtained from banks or from non-bank financial institutions. Equity financed firms as those with most of their investment financed from equity. Internally financed firms are those with most of their investment financed from retained earnings and the same applies for informal funds, which combines trade credit, borrowing from friends, family and other informal sources. However, where firm's investment is financed by an equal share of a combination of sources, these have been classified as hybrid.

X = Firm characteristics that that have been shown to have an effect on firm performance[48]. These include size of the firm, experience of their top manager, age of the firm, type of firm ownership, informal competition, operating capacity of the firm, and average education of production workers. We measure the size of the firm by the number of employees. Large firms are expected to be more productive than small firms (Girma and Vencappa, 2015). It is also expected that more experienced managers can steer a firm's productivity better than an inexperienced manager. Well-established firms are expected to have survived the teething problems encountered by new firms. Older firms are therefore considered to be more productive. Foreign owned firms are expected to be more productive than government owned, or privately owned domestic firms (Waldkirch, 2014). To capture this, we use data on the type of firm ownership, which includes private domestic, private foreign, government owned and other (e.g. sole proprietorship). Studies have shown that exporting firms are more productive than non-exporting firms (Delgado, Farinas and Ruano, 2002). We therefore control for the level of exports by including a variable that captures the percent of exports in a firm's sales.

δ_l represents location[49] fixed effects on the assumption that firms located in one region share certain characteristics. It is also assumed that financial institutions are more likely to be concentrated in a region that is viewed to be more productive, making it easier for firms to access finance.

[48] See Pushner (1995); Margaritis & Psillaki (2010) among others.
[49] Location refers to main business city.

To account for characteristics that are common to all the firms, but vary across time, we include time fixed effects represented by λ_t.

ν_j represents country fixed effects

η_s accounts for industry fixed effects.

4.4.3 Data

The data used in this study is the Enterprise Survey data, collected by the World Bank. A standardized sampling framework was used for data collected from 2005, making the data comparable across countries. The data is cross sectional, and the unit of observation is the firm. We focus on the manufacturing firms in Sub-Saharan Africa for our analysis. Stratification was based on firm size, with more emphasis on small and medium firms. Our sample therefore consists of 43% small firms, 34% medium firms, and 23% large firms across Sub-Saharan Africa.

Since only a subset of the data is used, the firms are filtered as follows: First, firms must have purchased fixed assets in the period under survey. Second, the firms must have data on financing choices for fixed assets. Third, firms must have data on the variables used to compute productivity, including net book value of assets to proxy physical capital and average years of school for a typical production worker, to proxy human capital. Countries for which these variables are missing are dropped. This leaves us with data from 26 countries. For the survey, interviewers were asked to give their opinion on the reliability of the data. The responses ranged from truthful, to somewhat truthful, to unreliable. Observations for which data was described as unreliable were dropped.

All the major manufacturing industries listed in the International Standard Industrial Classification (ISIC) revision 3.1. are covered in the data. To achieve a sufficient number of firms in each classification, we have combined some industries, based on similarities in the type of activity and factor intensity. This re-classification is similar to Saliola & Seker (2011) but in our case, we combine textiles, garments and leather into one industry as well as Chemicals, Plastics and rubber. This gives us a total of five major industries. Industries that fall outside the five major categories are classified as other. As noted in Saliola & Seker (2011), the sample design of the enterprise survey was such that the selected industries were targeted to facilitate industry level analysis, which we employ in our study.

Table 4-6: Industry classification

ISIC Code	Industry	Obs	Proportion (%)
15 & 16	Food & Tobacco	668	25.08
17, 18 & 19	Textiles, Garments & Leather	384	14.41
24 & 25	Chemicals, Plastics & rubber	314	11.79
26 & 27	Non-metallic & Basic metals	212	7.96
28 & 29	Fabricated metal & Machinery	376	14.11
-	Other Manufacturing	710	26.65
Total		2664	100

Source: World Bank Enterprise Survey

These responses are based on data from firms that purchased fixed assets and whose productivity could be estimated based on data availability. As noted earlier, firms that did not have data on labor and capital, and therefore whose productivity could not be estimated were dropped.

Descriptive statistics

The sample comprises firms that purchased fixed assets during the survey period, as our outcome variable of interest is tied to firms financing choices. It is evident that a large proportion of the firms rely on internal finance, with banks being the second most popular option. With limited access to finance for many enterprises in SSA, the heavy reliance on internal funds by firms in the sample is not surprising. The "other" category comprises trade credit, and ,borrowing from informal sources and we see more reliance on this source of finance compared to equity finance. Stock markets in SSA are not well developed, and are characterised by low levels of activity compared to stock markets in other developing countries and globally. It is therefore no surprise that there is little reliance on equity finance.

Table 4-7: Financing Choices

Financing choices	Obs	Mean
Bank Loan	379	15.02
Equity	72	2.85
Internal funds	1798	71.26
Hybrid	121	4.8
Others	153	6.06
Total	2523	100

Source: World Bank Enterprise Survey

Responses are for firms that purchased fixed assets and whose productivity could be estimated based on data availability. Firms with missing data on capital and labor were dropped as productivity could not be estimated.

As seen on table 4-8, the sample includes newly established firms that have been in operation for less than one year, and well-established firms, with the oldest having been in operation for 189 years. Average years of education for production workers is about 8[50] years, with some firms having unskilled workers. This could be explained by the growing population in SSA or the growth in the size of the labour force, coupled with low skills levels compared to other parts of the world. The average exports amount to 12 percent, an indication that most of the firms surveyed sell to the domestic market.

Table 4-8: Summary Statistics

Variable	Obs	Mean	SD	Min	Max
TFP (Using gross revenue)	2,641	12.97	2.47	7.06	23.24
TFP (Using Value added)	2,641	12.7	2.35	6.64	21.9
Age	3,043	18.92	16.96	0	189
Average education	2,419	7.66	4.9	0	26
Management experience	3,042	16.5	10.24	1	60
Capacity	2,515	0.88	0.33	0	1
Informal competition	3,015	1.76	1.38	0	4
Size	2,961	1.81	0.79	1	3
Exports	3,032	11.85	25.31	0	100
Ownership	2,961	0.22	0.42	0	1

Notes: Size: 1=Small; 2=Medium; 3=Large; Capacity=1 If a firm utilizes at least 50% of its capacity; Informal competition=0 if firms faces no obstacle from the practices of competitors in the informal sector, and it equals 4 for those facing very severe obstacles. Ownership=1 for firms with at least 10 percent foreign ownership and 0 otherwise.

Correlation coefficients

The correlation coefficients reported in table 4-9 below show that firms that rely more on bank funds and hybrid sources to finance most of their investments are associated with a positive TFP, compared to firms relying on equity funds, internal funds and informal funds (categorised as other). However, correlation coefficients are not enough evidence to confirm that bank financed firms are more productive than those using other sources of finance. This is because we have not controlled for other variables that could drive productivity. The positive correlation between productivity and firm age, management experience, capacity utilisation, firm size, and foreign ownership is expected, as well as the negative correlation

[50] Represents completion of primary education.

between productivity and informal competition. Exporting firms are also expected to be more productive than non-exporting firms and this is also seen in the positive correlation between exports and productivity. Further analysis is, however, needed to confirm causation.

Table 4-9: Correlation coefficients

Variable	TFP (Using gross revenue)	TFP (value added)	bank loan	equity fund	internal fund	hybrid	Others	Age	Average educ	Management exp.
TFP (Using gross revenue)	1									
TFP (value added)	0.99	1								
bank loan	0.17	0.16	1							
equity fund	-0.05	-0.04	-0.07	1						
internal fund	-0.13	-0.13	-0.71	-0.26	1					
hybrid	0.07	0.07	-0.1	-0.04	-0.36	1				
Others	-0.05	-0.05	-0.1	-0.04	-0.34	-0.05	1			
Age	0.4	0.4	0.05	-0.02	-0.04	0	0.02	1		
Average educ	0.04	0.06	0	0.04	0.04	0	-0.06	0.08	1	
Management exp.	0.19	0.19	0.09	-0.02	-0.07	0.02	-0.03	0.31	0.01	1
Capacity	0.09	0.09	0.01	-0.03	0.06	-0.03	-0.1	0	-0.02	0.01
Informal comp	-0.2	-0.18	-0.08	0.02	0.05	-0.02	0.04	-0.06	0.07	-0.02
Size	0.71	0.71	0.15	-0.01	-0.15	0.06	0	0.36	0.09	0.17
Exports	0.17	0.17	0.08	0.02	-0.1	0	0.05	0.12	0.03	0.04
Ownership	0.19	0.19	-0.04	0.03	0.02	-0.01	0.01	0.09	0.11	0.03

	Capacity	Informal comp.	Size	Exports	Ownership
Capacity	1				
Informal comp.	-0.04	1			
Size	0.03	-0.18	1		
Exports	-0.04	-0.1	0.23	1	
Ownership	-0.04	-0.05	0.21	0.11	1

4.5 Estimation Results

As noted in the literature, financially constrained firms are likely to overlook productive investments because of lack of funding opportunities, and are therefore likely to be less productive. We expect that large firms, which face less severe obstacles in accessing finance, are more productive than small and medium firms. As noted, too, in the literature, we expect that firms financing most of their investments using bank funds are more productive.

4.5.1 Non-parametric estimation results

The non-parametric results detailed below are based on a probability distribution analysis of the productivity of firms in relation to their choice of finance. This will give us a visual display of any heterogeneities in their productivity.

The productivity distribution of all firms based on sources of finance are shown in figure 4-1. As stated earlier, firms that did not purchase any fixed assets during the sample period are excluded from the analysis. At a first glance, we see the productivity of firms relying more on bank funds is distinguishably higher than that of firms relying on internal funds, equity funds, informal sources, and hybrid sources of finance. This is especially so for firms at the bottom end of the distribution. At the upper end of the distribution, the productivity of firms financing most of their investment using a hybrid source of funds and other informal sources appears higher than firms relying more on bank, equity, and internal funds. This is surprising, as we expect firms using formal sources of finance to perform better.

Figure 4-2a, which shows a comparison of the probability distribution of small and medium firms, indicates that, on average, firms that finance most of their investment using bank funds are more productive than firms using other sources of funds. Large firms, on the other hand, are on average more likely to have similar levels of productivity except for firms relying on a hybrid of sources of finance, as seen from figure 4-2b. These results clearly point to the heterogeneities that exist in the productivities of firms that could be a result of firm characteristics not accounted in the graphical analysis.

Figure 4-1 Probability distribution: All firms

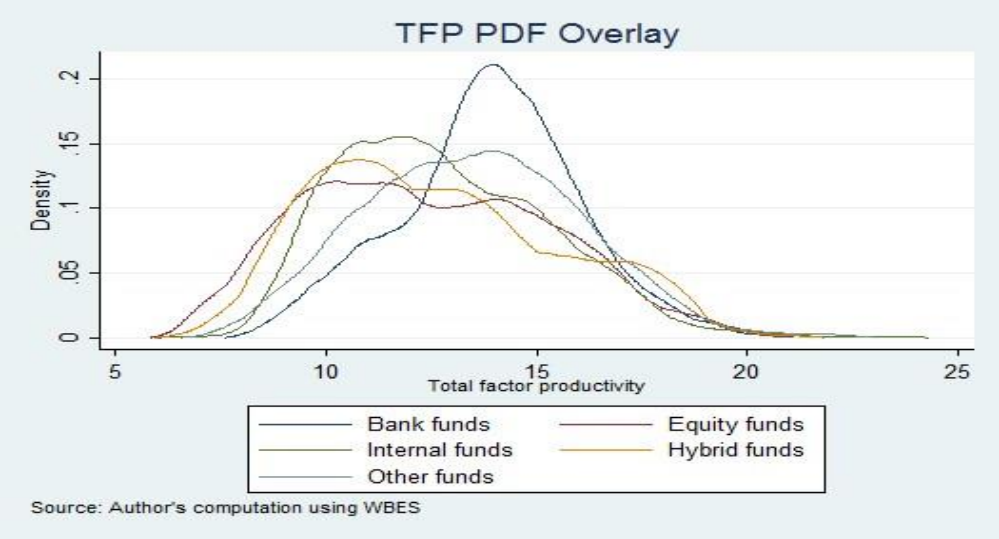
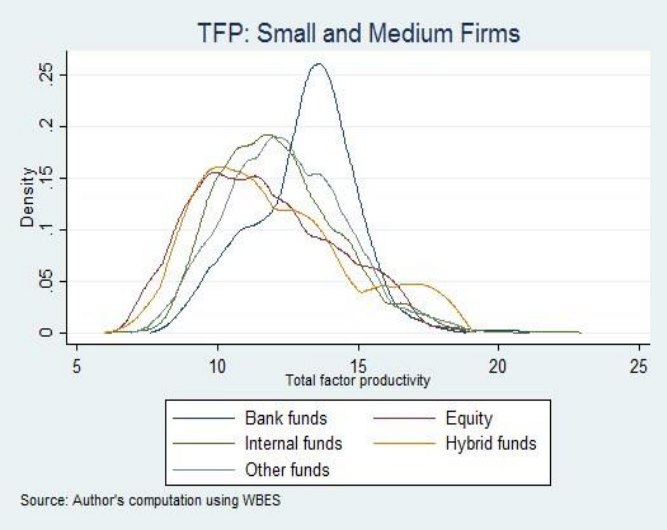
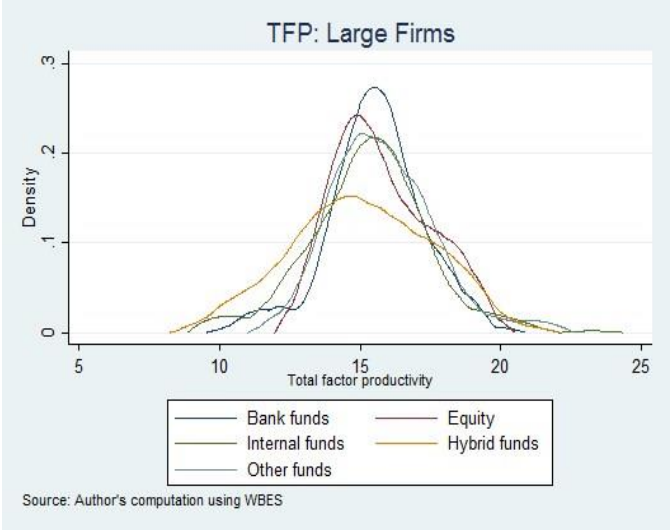


Figure 4-2: Probability distribution by firm size

(a) Small and Medium Firms (b) Large Firms





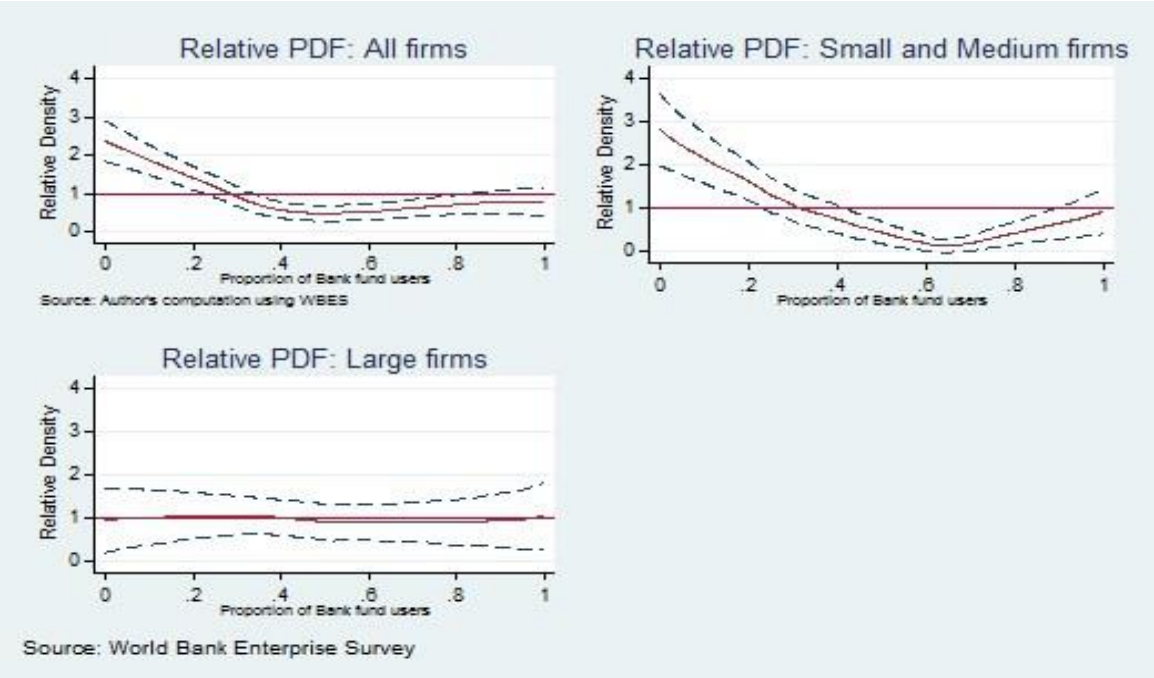
The graphical analysis above is in line with the agency cost theory that postulates that firms that rely on debt perform better than firms relying on other sources of finance. The reasons for this is that banks are in a better position to monitor the performance of firms funded by them (Levine, 2002), and also the fact that managers of firms with large amounts of debt fear bankruptcy as it damages their reputation, and therefore put more effort into ensuring firm profitability.

However, we cannot make quantitative interpretations from the distribution analysis. To be able to make statistical inferences of the productivity distributions, we turn to the relative distributions. Firms relying

on bank funds have higher productivity, especially the small and medium firms. We thus proceed by comparing bank funded firms with firms relying on each of the other sources[51].

The relative distribution of the productivity of firms relying on bank funds and those relying on equity fund is shown in figure 4-3. The dotted lines are the 95% confidence intervals. The first graph on the first row of figure 4-3 is for all firms, while the other 2 are disaggregated by firm size. The first graph shows that productivity of firms relying on equity funds falls below that of firms financing most of their investment with bank funds. Specifically, the 95% confidence interval of the first graph in row one shows that the productivity of firms relying on equity funds is approximately 2 to 3 times likely to fall below that of firms relying more on bank funds. Small and medium firms that rely on equity are 3 to 4 times less productive than similar sized firms relying on bank funds. The picture is different for large firms, with the graphs depicting less difference in the productivity of firms relying on equity and bank funds.

Figure 4-3: Relative productivity distribution of Bank and Equity fund users

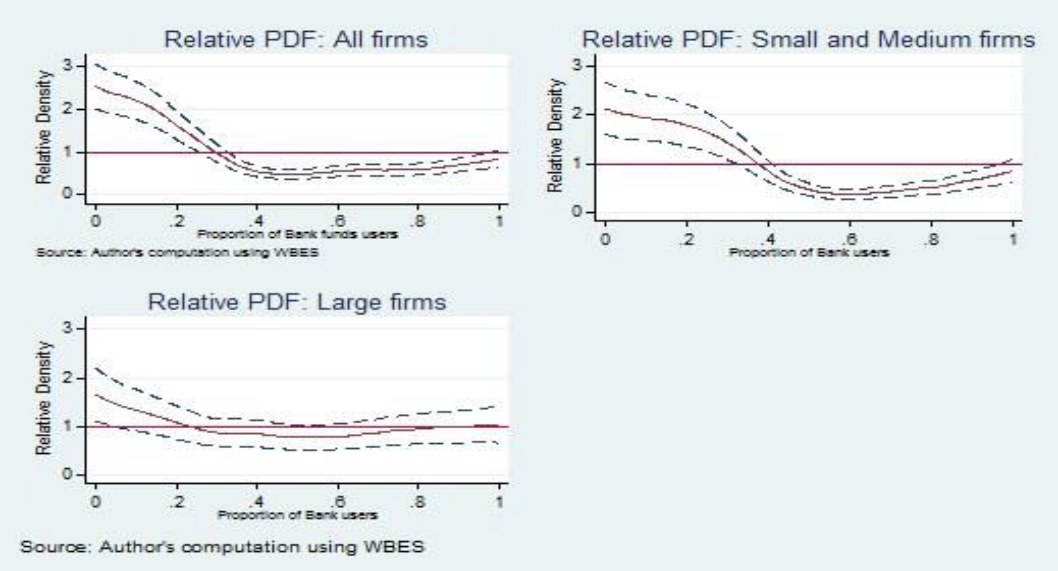


We compare the productivity of firms using mainly bank funds with that of firms using mainly internal funds. We see that, similar to results obtained from comparing firms relying on bank funds and those relying on equity funds, the productivity of firms relying on bank funds is still higher. Here, we however

[51] To limit the number of graphs, we only present results for the relative distribution of firms using banks vs those using equity funds, and firms using bank finance vs those using internal funds. The rest of the graphs are available on request.

show that the productivity of large firms relying on internal funds is, on average, two times below that of firms relying on bank funds at the bottom end of the productivity distribution.

Figure 4-4: Relative productivity distribution of Bank and Internal fund users



The above analysis suggests that there is a positive association between debt and productivity. Given the heterogeneities of countries in SSA, and the inclusion of South Africa in the analysis, one would expect firms in South Africa would dominate the results. However, excluding South Africa did not alter the results[52].

Many countries in SSA are characterised by low levels of growth and, as noted in section 3, the majority of firms face financial constraints, which limits their growth. It was noted that only about 14% of small firms have ties with financial institutions, compared to 41% of large firms. Banks have been shown to cherry pick customers and it may therefore be the case that firms relying more on bank funds are those with previous records of high profitability. The above analysis does not, therefore, give conclusive evidence that banks contribute to the productivity of firms. The parametric estimation enables us to further investigate this claim, by allowing us to control for other firm characteristics

4.5.2 Econometric estimation results

The results in table 4-10 are obtained from estimating the effect of firm financing choices on productivity using regression analysis. Columns (1) through to (5) represent different specifications of the model. In

[52] Graphs can be made available on request

column (1), we do not control for any fixed effects and instead run a pooled OLS. In columns (2) to (4), we have controlled for country, location and industry effects respectively, while column (5) shows results when we control for all fixed effects.

The results show that firms that finance a larger proportion of their investment using bank funds are more productive than firms that rely on other sources of finance. These results hold, even when we control for unobservable effects at country, location, and industrial classification levels. The assumption made in the literature is that banks are more likely to be concentrated in a location that has more productive firms. This has the possibility of leading to eventual relationship lending. Likewise, certain industries are more likely to be bank funded than others given the profitability associated with them. As Rajan & Zingales (1996) note, some industries are more dependent on external finance than others, hence the need to control for industry fixed effects. Time fixed effects control for the fact that the surveys were carried out during different fiscal years.

Column (1) shows that the lower productivity associated with equity, internal and informal funds is significant, even when we do not control for any unobservable fixed effects. Column (2) shows that, after controlling for country and time fixed effects, the lower productivity associated with equity becomes insignificant. Similar results are observed when we control for location and time fixed effects; the coefficient on equity becomes insignificant. However, when we control for industry fixed effects, shown in column (4), the negative coefficient on equity is significant. In column (5), where we control for all unobservable fixed effects (country, location, industry and time fixed effects), the results show that the lower productivity is only significant for firms that source internal and informal funds. The loss of statistical significance of equity finance when we account for country and location effects implies that there are some common (unobservable) factors at the country or regional level which matter for both firm productivity and equity.

Table 4-10: Financial Structure and Total Factor Productivity for all Firms

OLS Estimates of the Effect of Firm Financing Options on Firm Productivity. Dependent variable: TFP estimated from gross sales

Variables	(1)	(2)	(3)	(4)	(5)
Financing options (base category=bank)					
1. Equity	-0.915***	-0.266	-0.194	-0.653**	-0.217
	(0.28)	(0.26)	(0.26)	(0.26)	(0.25)
2. Internal funds	-0.494***	-0.429***	-0.360***	-0.457***	-0.341**
	(0.09)	(0.13)	(0.13)	(0.15)	(0.13)
3. Hybrid	-0.00228	-0.0715	-0.0176	-0.0223	-0.0329
	(0.18)	(0.21)	(0.19)	(0.20)	(0.19)
4. Others (Informal)	-0.887***	-0.647***	-0.709***	-0.850***	-0.699***
	(0.21)	(0.23)	(0.22)	(0.22)	(0.22)
Age	0.0221***	0.0164***	0.0159***	0.0157***	0.0150***
	(0.0024)	(0.0028)	(0.0029)	(0.0029)	(0.0029)
Management experience	0.00491	-0.0042	-0.00352	0.00797	-0.00182
	(0.0038)	(0.0044)	(0.0044)	(0.0050)	(0.0043)
Average education	-0.00412	0.0680***	0.0626***	0.0616***	0.0641***
	(0.0067)	(0.0224)	(0.0222)	(0.0184)	(0.0228)
Informal competition (base category= No obstacle					
1. Minor obstacle	-0.629***	-0.145	-0.183	-0.303**	-0.186
	(0.1080)	(0.1400)	(0.1420)	(0.1350)	(0.1390)
2. Moderate obstacle	-0.630***	-0.351**	-0.366**	-0.361**	-0.371**
	(0.1210)	(0.1400)	(0.1400)	(0.1610)	(0.1420)
3. Major obstacle	-0.530***	-0.101	-0.123	-0.238*	-0.14
	(0.1080)	(0.1230)	(0.1200)	(0.1220)	(0.1170)
4. Very severe obstacle	-0.481***	-0.183	-0.205	-0.227	-0.212
	(0.1370)	(0.1320)	(0.1370)	(0.1580)	(0.1350)
exports	-0.000627	0.00381*	0.00528**	0.00351	0.00544**
	(0.0018)	(0.0022)	(0.0022)	(0.0024)	(0.0023)
capacity	0.411***	0.296**	0.262**	0.375***	0.247**
	(0.1130)	(0.1150)	(0.1200)	(0.1310)	(0.1230)
Firm ownership (base category = private domestic)					
1. Private foreign	0.00501***	0.00404***	0.00430***	0.00320**	0.00346***
	(0.0011)	(0.0012)	(0.0012)	(0.0014)	(0.0013)
2. Government owned firms	0.00271	0.00546	0.00356	0.00766	0.00478
	(0.0077)	(0.0060)	(0.0065)	(0.0068)	(0.0071)
3. Other (e.g. sole proprietorship)	0.00205	0.00162	0.00259	0.0036	0.00243
	(0.0031)	(0.0034)	(0.0037)	(0.0047)	(0.0037)
Size (base category = Small size)					
1. Medium size	1.820***	1.463***	1.390***	1.539***	1.323***
	(0.0949)	(0.1100)	(0.1150)	(0.1090)	(0.1070)
2. Large size	3.720***	3.053***	2.927***	3.183***	2.840***
	(0.1130)	(0.1830)	(0.1890)	(0.1540)	(0.1910)
Constant	11.35***				
	(0.1750)				
Observations	1,842	1,452	1,448	1,443	1,439
R-squared	0.555	0.639	0.667	0.567	0.673
Country FE	No	Yes			Yes
Location FE	No		Yes		Yes
Industry FE	No			Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes

*Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

The columns represent results with various effects fixed as shown at the bottom of the table. The base category for the financing choices is bank funds.

For a robustness check, we compare the above results with results obtained from different measures of TFP, as detailed in section 4.1. These results, using value added to measure productivity, are presented in appendix C.4. The results are comparable to those in table 4-10, which show that bank funded firms are significantly and consistently associated with higher productivity than firms funded from internal and informal sources, regardless of which fixed effects we control for. Whereas the above results are contrary to findings in chapter three that the stock market, rather than the banking sector has a stable and significantly positive effect on overall economic growth, we argue that the direct focus on the firm rather than the aggregate economy wide effects accounts for this difference.

As shown in the distribution analysis, the productivity differences for large firms was less distinct, especially for bank vs equity fund users. We thus proceed by splitting the analysis for large and small and medium firms in order to establish if such differentials can be identified in the regression analysis.

4.5.2.1 Firm financing choices and firm productivity: Large firms

The results for large firms are shown in Table 4-11, while those for small and medium enterprises are shown in table 4-12. Overall, we see that the sign on the coefficient on equity is positive, though insignificant when we control for country and time fixed effects, and industry and time fixed effects. However, the productivity of large firms that finance most of their investment from bank funds is significantly higher than the productivity of those that finance investments using informal sources. These results are consistent when we control for country, location, industry and time fixed effects individually and collectively. Large firms are thus seen to exhibit different behaviour in this analysis, compared to the results that showed that firms that finance a their investments using internal funds have consistently lower productivity than those that use bank funds, regardless of the fixed effects we control for.

Table 4-11: Firm financing choices and Total Factor Productivity for Large Firms

OLS Estimates of the Effect of Firm Financing Options on Firm Productivity for Large Firms Dependent variable: TFP estimated from gross sales					
Variables	(1)	(2)	(3)	(4)	(5)
Financing options (base category = bank)					
1. Equity	0.192	0.198	-0.0465	0.333	-0.0966
	(0.4300)	(0.4380)	(0.3880)	(0.4140)	(0.3690)
2. Internal funds	-0.377**	-0.603*	-0.513	-0.479	-0.528
	(0.1640)	(0.3560)	(0.3710)	(0.3070)	(0.3750)
3. Hybrid	0.295	-0.0802	0.0276	-0.0424	-0.146
	(0.2970)	(0.4060)	(0.4510)	(0.3440)	(0.4350)
4. Others (Informal)	-0.787*	-1.097**	-1.066**	-1.252***	-1.187***
	(0.4440)	(0.4380)	(0.4370)	(0.3960)	(0.4390)
Observations	466	330	315	327	311
R-squared	0.245	0.417	0.469	0.364	0.499
Country FE	No	Yes			Yes
Location FE	No		Yes		Yes
Industry FE	No			Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes

*Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

In these results, we have controlled for other firm characteristics using the same control variables as those shown in table 9. They include age, management experience, average education of a typical production worker, informal competition, whether a firm is an exporter or not, capacity of the firm as well as the ownership structure of the firm, that is, if it is private domestic, foreign owned, domestic owned, government owned or other.

4.5.2.2 Firm financing choices and productivity: Small and medium firms

Comparing the results for small and medium firms with those of large firms, we see that, unlike large firms, small and medium firms that finance most of their investment using bank funds are more productive than firms that finance most of their investment from internal sources. These results are consistent across all specifications. Columns (1), (2) and (4) of table 4-12 show that the lower productivity associated with equity funds is significant, when we do not control for any unobservable fixed effects, and when we control for country and time fixed effects, and control for industry and time fixed effects. The results also show that firms that finance most of their investment using internal and informal funds are less productive than firms that used mainly bank funds, and this is consistent across all specifications.

Table 4-12: Firm financing choices and Total Factor Productivity for Small and Medium Size Firms

OLS Estimates of the Effect of Firm Financing Options on Firm Productivity for Small and Medium Firms Dependent variable: TFP estimated from gross sales

Variables	(1)	(2)	(3)	(4)	(5)
Financing options (base category = bank)					
1. Equity	-1.603***	-0.428*	-0.272	-1.095***	-0.289
	(0.3220)	(0.2570)	(0.2590)	(0.2820)	(0.2560)
2. Internal funds	-1.014***	-0.552***	-0.397***	-0.768***	-0.332**
	(0.1250)	(0.1440)	(0.1370)	(0.1830)	(0.1290)
3. Hybrid	-0.430*	-0.174	-0.0896	-0.203	-0.0599
	(0.2480)	(0.2580)	(0.2480)	(0.2550)	(0.2460)
4. Others (Informal)	-1.303***	-0.534*	-0.501*	-0.881***	-0.447*
	(0.2770)	(0.2800)	(0.2780)	(0.2760)	(0.2680)
Observations	1,376	1,121	1,116	1,116	1,111
R-squared	0.158	0.421	0.48	0.274	0.499
Country FE	No	Yes			Yes
Location FE	No		Yes		Yes
Industry FE	No			Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes

*Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Notes: In these results, we have controlled for other firm characteristics using the same control variables as those shown in table 9. They include age, management experience, average education of a typical production worker, informal competition, whether a firm is an exporter or not, capacity of the firm as well as the ownership structure of the firm, that is, if it is private domestic, foreign owned, domestic owned, government owned or other.

From table 4-11, the overall observation is that, in SSA, firms that finance a large proportion of their investment using bank funds are more productive than firms that rely on internal and informal sources of finance. This is especially so for small and medium firms, which are the majority in SSA.

Our results compare favourably with results by Levine & Warusawitharana (2014), who find that firms that rely on external finance have higher productivity growth than those that rely on internal finance. However, they use a broader definition of financial structure, and categorise financing choices into two broad categories of external vs internal funds. It differs from our analysis in that we further split external finance into either bank or equity finance. Our results also show that firms relying on internal funds are less productive than firms relying on bank finance, a form of external finance. However, this contradicts findings by Allen, et al. (2012) who maintain that, for India, bank and market finance are not associated with higher growth rates, and the single most important form of finance for Indian firms is non-bank and non-market external finance. Nevertheless, they note the importance of external finance (though not the

typical formal external[53] finance) relative to internal finance. They further affirm that, for developing countries like India, non-formal finance that is not dependent on legal institutions, and which is backed by alternative mechanisms outside the formal financial system may better promote growth and productivity.

These results give greater insight into the effects of firm financing choices on firm productivity than those obtained from the productivity distribution analysis. A shortcoming in the above analysis is its inability to account for causal effect running from productivity to choice of firm financing. It has been shown that some performance measures e.g. firm profitability, may influence a firm's demand for debt (Pushner, 1995), and that, while equity markets are more arm's length in their transactions with firms, banks closely monitor firms and identify promising entrepreneurs to fund. This means that only profitable firms have access to bank funds. This could explain the higher productivity among bank funded firms. However, Pushner (1995) subsequently notes that, while profitability may influence a firms demand for debt in the long-run, one does not expect a direct causal link between productivity and a firm's financial structure in the short-run, despite the existence of a positive correlation between the two. Due to data limitations, in this study, we are not able to establish the long-run effects of firm financing choices on productivity and are thus limited to the short-run, given that we cover only one sample period per unit (firm). We also argue that, while duality may be a possibility, the dynamic nature of the business environment in SSA is not conducive to long-term ties between financial institutions and firms, especially small and medium size firms. Government[54] influence on financial institutions has been shown to negatively affect firms' access to credit, especially in SSA, where the legal and institutional framework is weak. It is for this reason that we have restricted our analysis to the one-way effect of firm financing choices on productivity.

4.6 Conclusion

This study sought to investigate the relationship between firm financing choices and firm productivity in Sub-Saharan Africa, using firm level data obtained from the WBES. The analysis proceeded by estimating firm productivity as a measure of firm performance following the method by Ghosh, (2009). A linear Cobb-Douglas production function was assumed, and total factor productivity was inferred from the residual of the first order approximation of the linear production function. Both distribution analysis and regression estimation methods were then used to establish the relationship between firm financing

[53] Bank and equity finance
[54] Where this refers to the government of the day

choices and firm productivity. The distribution analysis, a non-parametric method of data analysis by Handcock & Morris (1998) was used. We examined the relative distribution of productivity of firms based on the sources of finance they use to fund their investments. We find support for the agency cost theory of firm financing, which postulates that firms that rely on debt rather than other forms of finance are, on average, more productive.

The distribution analysis showed that the productivity of firms relying more on bank funds is distinguishably higher than that of firms relying more on internal funds, equity funds, informal funding and a hybrid of the sources of finance. This is especially so for firms at the bottom end of the distribution. It was also observed that the differences in productivity of firms by their source of finance is more pronounced for small and medium firms, while there is no distinct difference between large firms relying on either bank funds or equity funds. The parametric results, based on regression analysis, also show that firms that finance most of their investments using bank funds are more productive, compared to firms that finance a significant proportion of their investments using other sources of finance. These results were mainly significant for small and medium firms, and they corroborate what the relative distribution of productivity shows. Like in the distributional analysis, the results from our regression analysis differ between small and medium firms and large firms. The productivity of bank funded small and medium firms is significantly and consistently higher than the productivity of firms funded from internal and informal sources, regardless of which fixed effects we control for. Large firms, on the other hand, showed less distinct results, with the productivity of firms relying on informal sources of finance being shown as consistently and significantly lower than that of firms using bank funds.

Overall, it appears that firms in SSA financing most of their investments using bank funds are significantly more productive than SSA firms utilising internal and informal funds. While the productivity of firms utilising equity funds was neither consistently nor significantly lower, we do find a consistently negative sign in all estimations for small and medium firms, even though the level of significance was dependent on the fixed effects that we controlled for.

One peculiarity of SSA is the under-development and under-performance of capital markets, coupled with stringent listing requirements. Small and medium firms are therefore less likely to rely on equity funds for their investment purposes, and instead opt for internal and informal sources of finance. From a policy perspective, countries in SSA would benefit from governments strengthening the banking sector and expanding access to credit for firms, rather than establishing capital markets, which could be left to a time when the banking sector is well developed.

We do, however, note that this study was limited to the use of cross sectional data because of the unavailability of panel data for a number of countries, which would have been useful in accounting for the dynamics in the analysis. The World Bank is expanding the availability of panel data, making it possible for future research to incorporate these dynamics and extend the analysis to the long-term effects of firm financing on productivity.

Appendix C

C.1 Variable definition

Variable	Definition	Source
Size	Size of the firm is based on number of employees, where 5 - 19 = Small; 20 - 99 = Medium and >100 = Large	WBES
Export	This includes the value of exports of a firm, ranging from 0% to 100%	WBES
Age	Age of the firm	WBES
Average education	This is the average education for a typical production worker	WBES
Management experience	These are the number of years of experience for the top manager	WBES
Capacity	Capacity utilisation =1 if a firm that use over 50% of its capacity and zero otherwise	WBES
Ownership structure	Has four categories as described below;	WBES
(i) Private foreign	Represents % owned by private foreign individuals, companies or organizations	
(ii) Private domestic	Represents % owned by private domestic individuals, companies or organizations	
(iii) Government	Represents % owned by government/state	
(iv) Other	Represents % owned by Other e.g. sole proprietorship	
Informal competition	Represents how much of an obstacle the practices of competitors in the informal sector are and is coded 1(No obstacle) to 5 (very severe obstacle)	WBES

World Bank Enterprise Survey

C.2 Firm Financing Patterns across Sub Saharan Africa

Proportion of fixed assets financed from the various sources (% of responses)							
	Country	Bank loan	Equity	Internal funds	Others	Hybrid	Total
1	South Sudan	2.5	5	87.5	2.5	2.5	100
2	Sudan	0	0	81.25	18.75	0	100
3	Angola	4.55	0	88.64	2.27	4.55	100
4	Benin	14.29	0	78.57	7.14	0	100
5	Botswana	24	8	56	2	10	100
6	Burkina Faso	14.29	2.86	74.29	5.71	2.86	100
7	Burundi	32	0	60	8	0	100
8	Central African Republic	0	5.88	88.24	5.88	0	100
9	Cote d'Ivore	2.13	0	85.11	10.64	2.13	100
10	Cameroon	20.31	1.56	54.69	14.06	9.38	100
11	Cape	24.14	10.34	62.07	3.45	0	100
12	Chad	2.86	2.86	88.57	2.86	2.86	100
13	Congo	0	0	100	0	0	100
14	DRC	0	0	96.08	0	3.92	100
15	Eritrea	6.25	0	87.5	6.25	0	100
16	Ethiopia	5.15	7.22	82.47	0	5.15	100
17	Gabon	6.25	0	93.75	0	0	100
18	Gambia	12.5	0	62.5	12.5	12.5	100
19	Ghana	12.71	2.76	72.93	6.08	5.52	100
20	Guinea	0	0	94.87	3.85	1.28	100
21	Guinea Bissau	0	0	86.96	13.04	0	100
22	Kenya	27.81	4.28	56.15	3.74	8.02	100
23	Lesotho	16.67	9.52	57.14	11.9	4.76	100
24	Malawi	20.31	1.56	73.44	3.13	1.56	100
25	Mali	5.26	0	92.11	2.63	0	100
26	Mozambique	3.39	0	91.53	3.39	1.69	100
27	Namibia	25	3.33	63.33	0	8.33	100
28	Niger	6.25	3.13	78.13	3.13	9.38	100
29	Nigeria	5.5	8.59	60.14	20.27	5.5	100
30	South Africa	23.35	0	67.07	3.59	5.99	100
31	Rwanda	26.92	11.54	42.31	0	19.23	100
32	Senegal	11.29	0	74.19	6.45	8.06	100
33	Tanzania	25.49	3.92	65.36	1.96	3.27	100
34	Togo	4.17	4.17	87.5	4.17	0	100
35	Uganda	11.02	3.94	78.74	1.57	4.72	100
36	Zambia	9.43	3.14	79.87	4.4	3.14	100
37	Zimbabwe	7.63	0.85	85.59	5.93	0	100
38	Liberia	17.86	0	78.57	3.57	0	100
39	Mauritius	51.9	0	37.97	2.53	7.59	100
40	Sierra Leone	2.5	2.5	92.5	2.5	0	100
41	Swaziland	11.11	0	82.22	2.22	4.44	100
Total		14.22	2.95	72.6	5.7	4.53	100

Source: World Bank Enterprise Survey

Notes: Figures presented above are country averages for all firms

C.3 Firm Financing Patterns by Country and Firm Size

Country	Bank loan	Equity	Internal funds	Others	Hybrid	Total
Small firms						
Botswana	20	6.67	60	0	13.33	100
Burkina Faso	7.14	0	85.71	0	7.14	100
Ghana	8.74	2.91	78.64	4.85	4.85	100
Kenya	18.18	9.09	60.61	3.03	9.09	100
Lesotho	26.83	12.2	43.9	14.63	2.44	100
Nigeria	3.93	5.74	33.53	54.38	2.42	100
South Africa	17.28	0	74.07	3.7	4.94	100
Tanzania	3.17	3.17	88.89	1.59	3.17	100
Uganda	11.43	5.71	77.14	1.43	4.29	100
Zambia	6.94	1.39	83.33	4.17	4.17	100
Mauritius	46.88	0	37.5	6.25	9.38	100
.	.	.	.	.	.	.
.	.	.	.	.	.	.
All countries	8.88	3.08	68.58	16.03	3.44	100
Medium Firms						
Botswana	27.27	9.09	54.55	4.55	4.55	100
Burkina Faso	21.43	0	64.29	14.29	0	100
Ghana	14.04	1.75	70.18	7.02	7.02	100
Kenya	33.8	2.82	54.93	1.41	7.04	100
Lesotho	24.32	8.11	51.35	13.51	2.7	100
Nigeria	3.57	4.76	31.55	58.33	1.79	100
South Africa	30.5	0	61.7	2.13	5.67	100
Tanzania	39.62	5.66	50.94	1.89	1.89	100
Uganda	5.41	2.7	86.49	0	5.41	100
Zambia	10	5.71	80	2.86	1.43	100
Mauritius	56.25	0	40.63	0	3.13	100
.	.	.	.	.	.	.
.	.	.	.	.	.	.
All countries	**17.95**	**3.24**	**62.53**	**12.58**	**3.7**	**100**
Large firms						
Botswana	23.08	7.69	53.85	0	15.38	100
Burkina Faso	14.29	14.29	71.43	0	0	100
Ghana	28.57	4.76	52.38	9.52	4.76	100
Kenya	26.51	3.61	55.42	6.02	8.43	100
Lesotho	0	8.33	75	12.5	4.17	100
Nigeria	5.19	2.6	41.56	50.65	0	100
South Africa	18.75	0	68.75	5.36	7.14	100
Tanzania	43.24	2.7	45.95	2.7	5.41	100
Uganda	23.81	0	66.67	4.76	4.76	100
Zambia	17.65	0	64.71	11.76	5.88	100
Mauritius	53.33	0	33.33	0	13.33	100
.	.	.	.	.	.	.
.	.	.	.	.	.	.
All countries	**17.46**	**2.93**	**63.97**	**9.92**	**5.73**	**100**

Source: World Bank Enterprise Survey

Notes: This tables only shows a sample of countries used in the analysis. The selection of country results to display was not based on any criteria. Results for other countries are available on request.

C.4 Estimation results using value added

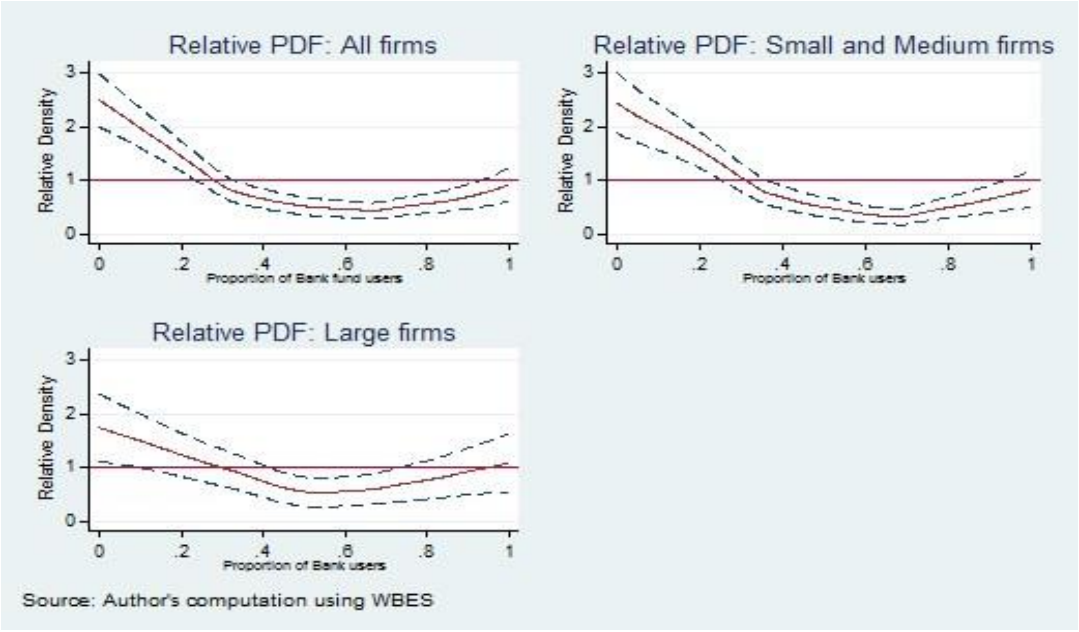
OLS Estimates of the Effect of Firm Financing Options on Firm Productivity for all firms. Dependent variable: TFP measured using value added

Variables	(1)	(2)	(3)	(4)	(5)
Financing options (base category = bank)					
1. Equity	-0.697***	-0.167	-0.11	-0.538**	-0.13
	(0.2610)	(0.2330)	(0.2280)	(0.2420)	(0.2220)
2. Internal funds	-0.426***	-0.344***	-0.292**	-0.392***	-0.273**
	(0.0869)	(0.1230)	(0.1240)	(0.1350)	(0.1260)
3. Hybrid	0.0714	-0.00458	0.0455	0.0529	0.0364
	(0.1770)	(0.1970)	(0.1810)	(0.1880)	(0.1820)
4. Others (Informal)	-0.816***	-0.577***	-0.640***	-0.796***	-0.629***
	(0.1970)	(0.2160)	(0.2130)	(0.2160)	(0.2120)
age	0.0205***	0.0146***	0.0139***	0.0146***	0.0129***
	(0.0023)	(0.0027)	(0.0028)	(0.0028)	(0.0027)
Management experience	0.00434	-0.00438	-0.00356	0.00714	-0.0019
	(0.0037)	(0.0043)	(0.0044)	(0.0047)	(0.0042)
Average education	0.0028	0.0593***	0.0536**	0.0565***	0.0552**
	(0.0063)	(0.0217)	(0.0222)	(0.0173)	(0.0228)
Informal competition:					
1. Minor obstacle	-0.572***	-0.126	-0.16	-0.296**	-0.165
	(0.1010)	(0.1350)	(0.1360)	(0.1300)	(0.1320)
2. Moderate obstacle	-0.533***	-0.304**	-0.328**	-0.319**	-0.335**
	(0.1170)	(0.1330)	(0.1340)	(0.1570)	(0.1370)
3. Major obstacle	-0.414***	-0.0503	-0.0693	-0.196	-0.0868
	(0.1030)	(0.1250)	(0.1220)	(0.1260)	(0.1180)
4. Very severe obstacle	-0.417***	-0.135	-0.169	-0.236	-0.178
	(0.1310)	(0.1330)	(0.1380)	(0.1690)	(0.1360)
exports	-7.90E-05	0.00348	0.00490**	0.00372*	0.00513**
	(0.0017)	(0.0021)	(0.0021)	(0.0022)	(0.0022)
capacity	0.404***	0.262**	0.229**	0.342***	0.217*
	(0.1070)	(0.1050)	(0.1100)	(0.1260)	(0.1130)
Private foreign firms	0.00464***	0.00397***	0.00414***	0.00250*	0.00333***
	(0.0010)	(0.0011)	(0.0011)	(0.0013)	(0.0012)
Government owned firms	0.00325	0.00635	0.00396	0.0071	0.0053
	(0.0077)	(0.0055)	(0.0060)	(0.0066)	(0.0065)
other (e.g. sole proprietorship)	0.00296	0.000926	0.00178	0.00401	0.00163
	(0.0031)	(0.0032)	(0.0035)	(0.0045)	(0.0035)
Firm size: Medium	1.760***	1.405***	1.327***	1.509***	1.260***
	(0.0904)	(0.1070)	(0.1120)	(0.1130)	(0.1030)
Firm size: Large	3.593***	2.912***	2.788***	3.082***	2.705***
	(0.1070)	(0.1720)	(0.1780)	(0.1480)	(0.1800)
Constant	10.95***				
	(0.1680)				
Observations	1,842	1,452	1,448	1,443	1,439
R-squared	0.555	0.657	0.683	0.576	0.689
Country FE	No	Yes			Yes
Location FE	No		Yes		Yes
Industry FE	No			Yes	Yes
Year FE	No	Yes	Yes	Yes	Yes

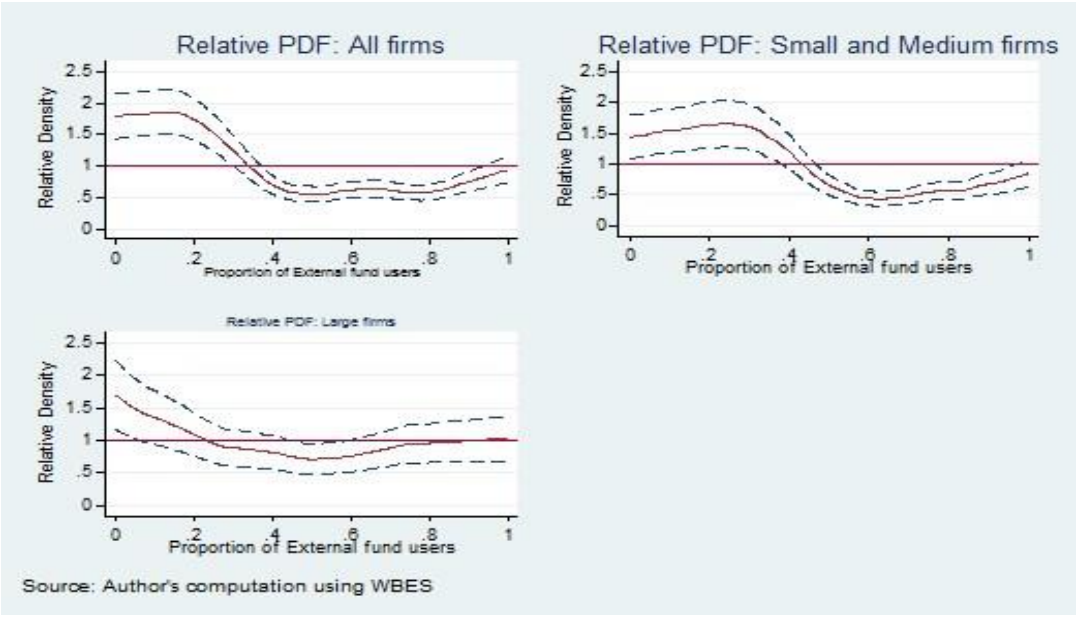
*Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*

C.5 Relative distribution of productivity

C.5.1 Relative distribution of productivity of bank and informal (others) funds users



C.5.2 Relative distribution functions of productivity of firms using external funds (bank and equity) vs internal sources of funds



Chapter 5

Summary and Conclusion

In recent years, the role of a country's financial structure in economic growth has become the subject of a continuous debate within the finance-growth literature. Empirical work on the role of financial structure on economic growth offers no consensus, with studies either arguing that a bank-based or market based financial system is more conducive for growth, while others conclude that the structure of the financial system does not matter for growth.

At the same time, most of the existing empirical work on the issue focuses on developed countries and regions. The very limited research on developing countries is mainly due to data unavailability. SSA in particular, is a region that has been neglected in the relevant literature, as stock markets in the region are young compared to those in developed countries. Financial reforms in SSA in the late 1980s and early 1990s, included the establishment of stock markets as one of the requirements (Yartey and Adjasi, 2007). This was aimed at promoting growth in the region, and expanding the sources of finance, especially to firms.

The key question that this study aimed to address is whether financial structure has an effect on economic growth in SSA. We investigated this in three related studies. Chapter two looked at the influence of financial structure on economic growth in SSA, using recent data obtained from the Global Financial Development Database (GFDD) on the characteristics of financial systems around the globe. Because of cross country heterogeneities, we postulated that drawing conclusions based on panel data studies could lead to misleading conclusions for specific countries. This concern has also been raised in the literature (see Levine (1996); Luintel, Khan, Arestis & Theodoridis (2008)). This issue was addressed in the third chapter of the thesis, which provided evidence on financial structure and growth from Kenya. Kenya has a relatively well developed financial system by the standards of developing countries. Financial innovations, especially mobile banking, have contributed to the expansion of the provision of financial services aimed at promoting growth. While finance plays a crucial role in firm performance, the financial structure in a country determines the financing choices available to a firm. Having established the financial structure-growth relationship at a macro level, we considered the influence of firm financing choices on firm performance in SSA. This issue was addressed in chapter four. The establishment of stock markets, besides promoting overall economic growth, was aimed at expanding the sources of finance for firms. However, firms' financing decisions depend not only on the availability of funds, but also on other factors

such as cost, benefits and accessibility, and these have an effect on firm performance. In this chapter, therefore, we adopted a microeconomic approach, by looking at the various sources of firm finance and their role in firm performance in SSA.

Specifically, chapter two employed a dynamic panel estimation method in order to provide empirical evidence on the financial structure-growth relationship in SSA over the period 1980 - 2014. The study included fourteen countries from the region, based on the existence of a banking sector and a stock market. This was important, as it was the basis for the definition of financial structure. The results showed that, in the long-run, financial structure is not significant in influencing growth in SSA. Even after controlling for countries with better developed financial systems (Mauritius and South Africa), the results did not change and the main conclusion that financial structure does not matter for long-run growth still holds. Stock markets in SSA are not geared towards addressing the capital needs of the region. The SSA banking sector is also inefficient and underdeveloped. These factors could explain the finding that financial structure does not matter for growth in the region in the long-run.

The short-run results, on the other hand, were rather mixed. After controlling for the level of financial development, the results indicate that financial structure matters in 5 of the 14 countries - Malawi, Nigeria, Swaziland, Tanzania and Zimbabwe. What is interesting from these results is that financial structure does not matter in the case of Mauritius and South Africa, the two countries that were observed to have superior financial systems. These results point to the heterogeneous nature of the effect of financial structure on economic growth, a reflection of the differences in the banking sectors as well as the functioning of the stock markets.

The mixed results owing to the different institutional features among the SSA countries pointed to the need for a country case study that allowed for a more detailed analysis of the financial structure-growth relationship, taking into consideration the country specific features. This was addressed in chapter three, which provided empirical evidence from Kenya. This study therefore sought to contribute to the existing literature that argues that panel estimates do not correspond to time series estimates. Three issues were addressed in this study. The first issue addressed was the independent role of the banking sector, the second issue was the independent role of the stock market, while the third issued addressed the overall effect of financial structure on economic growth. Using both annual data over the period 1974 – 2014 and quarterly data over the period 2002 - 2014, and employing the ARDL bounds approach to cointegration, the results showed that, while the stock market has a positive and significant effect on growth in Kenya both in the short-run and the long-run, the banking sector generally has a negative and significant effect on growth in

the short-run. However, the long-run results were inconclusive, using both quarterly and annual data. While results from the annual data showed no significant effect on growth, results from quarterly data showed a negative and significant effect.

The negative effect of the banking sector on growth was attributed to poor lending practices in Kenya as well as to the historical political influence on bank loans (ECA, 1997) and weak legal and regulatory framework. It was, however, expected that we would observe a reversal of the negative effect of the banking sector on growth using quarterly data for a more recent time period (2002 – 2014), characterized by a financially liberalized banking sector. We did not see this, and the results can be explained by the carry-over of a large proportion of non-performing loans by Kenyan banks.

Results on the overall effect of the financial structure on growth showed that financial structure does not matter in influencing growth in the long-run in Kenya. The conclusion from the short-run results based on time-series estimation methods corresponded to the conclusion drawn from short-run results obtained from the regional study, that is, that financial structure does not matter in the short-run. For Kenya however, we included components of financial structure that capture various aspects of the financial system, in order to provide a more detailed analysis. Our findings led us to conclude that it does not matter for growth whether Kenya is bank-based or market-based. A possible explanation for this finding could be the fact that though the stock market has been in existence for longer in Kenya (since 1954) than in most countries in SSA, it was only in 2013 that a market segment targeted at SMEs was launched, that enables these firms to raise capital from the stock market. Likewise, even though the banking sector is considered relatively well developed by the standards of developing countries, it is still underdeveloped by international standards. The literature has shown that a country's financial sector development needs to get to a certain threshold before it can have a positive effect on growth (Owen and Temesvary, 2014). It is possible that Kenya has not attained this threshold. Policymakers in other countries could learn from this case study, as they seek to develop their financial sectors. More specifically, countries need targeted financial sector development that addresses the specific needs of the country. For example, in countries with relatively young stock markets, there is need to focus at the outset on market segments that target financing for SMEs alongside the main investment market segment.

Chapter four used a microeconomic approach to address the effect of firm financing choices on firm performance, as measured by firm productivity. The key objective in this chapter was to investigate the differences in firm productivity based on the choice of firm financing. We analysed cross sectional data from 26 countries in SSA collected over the period 2005 – 2013.The results showed that, in general, firms

that rely more on the banking sector to finance their investment needs are more productive than firms relying on the other sources of finance, including equity, internal sources, informal sources and a combination of sources. The study made use of both parametric and non-parametric methods and the results from both methods consistently showed that productivity was significantly higher for small and medium enterprises that mostly use bank finance compared to firms which use other sources of finance. However, the results for large firms showed that those relying on informal and internal sources of finance were less productive than those utilising bank funds. The study did not find any significant effect on the productivity of firms relying more on equity funds or a hybrid of sources. One peculiarity of SSA is the under-development and under-performance of capital markets, coupled with stringent listing requirements. As noted earlier, stock market segments that target SMEs are fairly recent in many countries, an indication that SMEs in the region have not had the opportunity to raise capital from the stock market. They are therefore less likely to rely on equity funds for their investment purposes and instead opt for bank loans, or internal and informal sources of finance. As the stock market segments for SMEs develop further, it is expected that there will be an increase in the availability of equity finance, allowing SMEs to have more growth opportunities in the future.

Overall, there is no doubt that stock markets are beneficial in an economy. However, given that many countries in SSA are characterised by small and medium firms that are mostly not listed on the MIMs of the stock markets due to stringent listing requirement, there is need to develop alternative investment market segments that target SMEs for countries that have already established a stock market. There is also need to ensure the efficient delivery of banking services, especially to SMEs, as it appears that firms relying on bank finance are more productive. We, however, expect increased competition from the stock market as they open up opportunities for SMEs with high growth potential.

This thesis was not without limitations. First, the fact that not all countries in SSA have established stock markets that have been in operation for a number of years limited the sample size to 14 countries, in a region that consists of 48 countries. Secondly, time-series evidence was only obtained from one country, and there is need for more country case studies for further evidence on the effect of financial structure in SSA. Thirdly, because of data limitations, we could not establish the dynamics of firm financing, and the effect on firm productivity. There is therefore a need for further research when more data becomes available.

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